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Endoscopic Sentinel Node Biopsy is Less Invasive and Facilitated by SPECT-Fused 3D-CT Lymphography

By Koji Yamashita
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Abstract- Background: The endoscopic surgery for the breast diseases has been proven safe and aesthetic and named as video-assisted breast surgery (VABS). We also applied it for sentinel node (SN) biopsy. We firstly succeeded to fuse the single photon emission computed tomography (SPECT) with 3D-CT mammary lymphography (LG). It can show the detailed position of all SNs with or without RI uptake.

Method: In 3D-CT LG, 2 ml of Iopamidol 300 was injected subcutaneously above the tumor and the periareola. CT scan was taken 1 minute after injection to produce a 3D image of lymph ducts and nodes. In the lymphoscintigraphy, ^{99m}Tc phytate 74mBq was injected, and SPECT was taken after 2 hours. We fused it with 3D-CT LG. SN biopsy was performed endoscopically by dye and RI method.

Keywords: Radioisotope, Dye, Single photon emission computed tomography (SPECT), Endoscopic surgery, Sentinel lymph node biopsy, Lymphography, 3D-CT, Breast cancer.

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Results: We have performed SN biopsy with 3D-CT LG on 160 patients, RI with 3D-CT LG on 32 patients, and SPECT fused 3D-CT LG on 20 patients. We could detect the position of RI-positive SN on the axillary lymphatic mapping of SPECT-fused 3D-CT LG by a gamma probe during surgery. The average sampled number of SN was 2.3. The dye-negative SN and RI-negative SN could be removed endoscopically. There was no false negative study. The wound scars were only 1 cm long, and were inconspicuous and aesthetic.

Conclusions: The endoscopic SN biopsy is aesthetic and less invasive, which is facilitated by SPECT-fused 3D-CT LG.

Keywords: Radioisotope, Dye, Single photon emission computed tomography (SPECT), Endoscopic surgery, Sentinel lymph node biopsy, Lymphography, 3D-CT, Breast cancer.

I. INTRODUCTION

In early breast cancer, the presence of metastasis in axillary lymph nodes (AN) is an important factor in prognosis and further treatment. Sentinel node (SN) biopsy provides us valuable information about no need to dissect AN for node-negative patients [1, 2]. SN is defined as the first lymph node drained of lymph flow from the tumor [3, 4]. The most commonly used methods to identify the SN are dye-staining [5, 6] and radioisotope (RI) incorporation [7, 8]. We have reported the usefulness of multidetector-row three-dimensional computed tomography (3D-CT) mammary lympho-

graphy (LG) for SN biopsy [9, 10, 11]. It can show the detailed relations between lymph ducts and lymph nodes in the axilla on the anatomical architecture [12]. And the late phase of 3D-CT LG of the breast can show the axillary lymphatic architecture from SN into venous angle [13].

3D-CT LG can decrease the false negative study of SN biopsy with RI and/or dye-staining methods. However, during surgery, we sometimes miss the exact node detected by 3D-CT LG, because the discrepancy of SN exists between RI, dye, and 3D-CT LG. Up to the present, we have used the skin marking with oil pen projected by the laser pointer of CT. The single stained node can be found easily, but multiple adjacent nodes cannot be distinguished each other.

The conventional lymphoscintigraphy shows the RI-uptaken nodes, but it cannot show its exact location. Single photon emission computed tomography (SPECT) show the exact location of RI-uptaken nodes in the anatomical architecture. We firstly succeeded to fuse this SPECT with our 3D-CT LG. It can show the RI-uptaken nodes are coincided with some of the enhanced SNs by 3D-CT LG. Some SNs of 3D-CT LG included RI-uptaken nodes, and dye-stained nodes, and bi-negative nodes. We can notice the location of RI-uptaken nodes in the SN mapping of 3D-CT LG. During surgery, RI detector probe can navigate hot node. We can find the other nodes relative to these hot nodes in SN mapping of 3D-CT LG.

II. MATERIALS AND METHODS

a) Patients

From July 2002 to March 2010, 700 patients with breast disease were treated surgically by us in the Department of Surgery at the Nippon Medical School of Musashikosugi Hospital and Main Hospital. We performed video-assisted breast surgery (VABS) for the patients with a limited small breast cancer at surgery [14, 15]. We also performed SN biopsy for the patients without clinical axillary node metastasis. A SN biopsy was performed for 200 patients, 160 of which involved SN biopsy using VABS and 3D-CT LG. The patient characteristics are shown in Table 1. Down-staged cases treated by preoperative systemic chemotherapy (PST) are included. For example, the patient with large

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tumor of 10 cm in diameter gained pathological complete remission (pCR) after PST. These patients did not have any clinical metastasis of axillary nodes after PST.

b) 3D-CT lymphography

Interstitial 3D-CT LG was performed using a 16-channel multidetector-row helical 3D-CT scanner (Toshiba Aquilion 16; Toshiba Medical Systems Corporation, Tochigi, Japan). The patients were placed in the supine position with arms positioned in the lateral abduction direction suitable for the operating position. After local anesthesia by subcutaneous injection of 1% lidocaine (0.5 ml), 2 ml of contrast enhancing material iopamidol (Iopamiron 300; Nihon Shering, Osaka, Japan) were injected intracutaneously into the periareolar skin and the skin above the tumor. A CT image with a 3-mm slice thickness was taken 1 and 5 minutes after injection. SN was identified on transaxial CT images, and their location was marked on the skin surface with an oil-painting pen using a laser pointer of CT the day before the surgery. Next, 3D-CT images were reconstructed from transaxial enhanced CT images, which clearly showed the lymph ducts and SN. 3D-CT LG was also performed for the arm LG. 2 ml of iopamidol were injected in the upper inner arm along the medial intramuscular groove of the ipsilateral arm after local anesthesia. A CT image was taken 5 minutes after injection on the same condition.

c) Spect

On the day before surgery, 74 MBq technetium 99m (99mTc) phytate (FUJIFILM RI Pharma Co., LTD., Tokyo, Japan) in sterile saline (total volume 1 mL) was injected intradermally into two different sites of the skin above the tumor and around the periareola. Lymphoscintigraphy and SPECT were performed 2 hours after injection of radio colloid. If one or more focal accumulations of radioactivity (hot spots) were visualized, these were assumed to be SNs. Small amount of RI markers were positioned on the jugular notch of sternum and the xiphoid process to correct the fusion points. We used the image fusion software Syntegra [16] (Philips Medical Systems, Eindhoven, The Netherlands) and Real INTAGE (KGT, Tokyo, Japan) to fuse SPECT data with 3D-CT LG.

d) Surgical methods

Previously, VABS has been described in detail [15]. The following operative procedures were performed: skin incision in the axilla and/or periareola, skin flap formation via the tunnel method [17], pectoral muscle fascia dissection, vertical section of the mammary gland, SN biopsy by the dye-staining method guided by preoperative 3D-CT LG marking, and axillary node dissection (levels 1 and 2). Radiotherapy and chemotherapy were performed for malignant diseases.

The SN biopsy was performed by the dye-staining method using a part of the VABS technique at

the beginning of the operation before gland resection. In the periareolar region and over the tumor, 2 ml of 1% indocyanine green were injected subcutaneously. A 1-cm-long skin incision was made along wrinkles in the axilla at the position marked by 3D-CT LG. A Visiport optical trocar (Covidien Japan, Tokyo, Japan) was inserted into the incision after 20 minutes. The endoscopic view was observed through the Visiport with a 10-mm-diameter straight-angled rigid endoscope (Olympus Optical, Tokyo, Japan), and the stained nodes were found by following the dye in the lymph ducts. RI detector probe NAVIGAOR GPS system (Covidien Japan, Tokyo, Japan) was used for detecting RI-uptaken nodes.

The lymph nodes were sampled, and metastasis was determined from fast frozen sections. To remove them, we left the external tube of the Visiport and grasped the nodes by the endodissector (Johnson & Johnson Company, New Brunswick, NJ, USA), then cut and shielded the surrounding lymph duct and vessels using the harmonic scalpel (Johnson & Johnson Company). Axillary node dissection was performed at levels 1 and 2 with bipolar scissors through the same incision, which was lengthened to 2.5 cm. The inferior pectoral nerve, long thoracic nerve, second and third intercostobrachial nerves, thoracodorsal nerve, artery, and vein were observed and preserved. The lateral pectoral artery was preserved for the lateral tissue flap. After surgery, SN and axillary nodes were pathologically examined by standard hematoxylin and eosin staining. Breast reconstruction was simultaneously performed either by mobilization of the remnant mammary gland and by filling the lateral thoracic fat tissue flap (LTF) or by filling an absorbent synthetic fiber [17].

Informed consent for the procedure was obtained from all the patients before surgery.

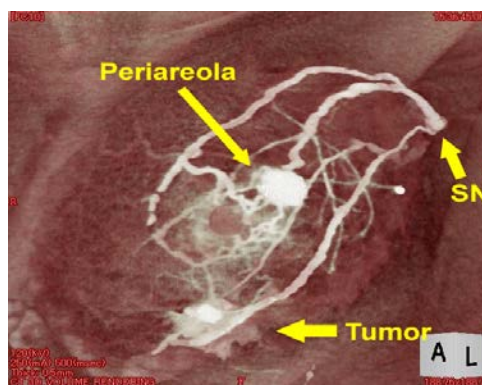


Fig.1 : 3D-CT lymphography (LG) showed the lymphatic system from the breast to the sentinel node (SN). The periareolar lymphatic flow was draining from the tumor or from the other area of the breast. It was circling around the nipple-areolar complex and going into SN in the axilla. Some lymph ducts from the tumor were going directly into SN

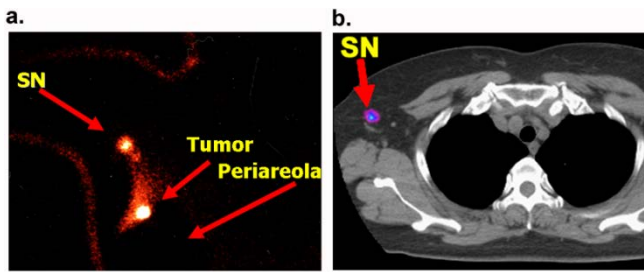


Fig.2: a. Lymphoscintigraphy
The conventional lymphoscintigraphy shows only information about the existence of nodes with an uptake of RI as hot spots
b. Single photon emission computed tomography (SPECT)
SPECT-CT can show the exact location of the hot spots on the axial view of the CT image, as showing in the figure. They are always coincided with the axillary nodes.
SN: sentinel node

III. RESULTS

We have performed 3D-CT LG on 160 patients, and the lymphoscintigraphy with 3D-CT LG on 32 patients. 3D-CT LG clearly showed the precise lymphatic flow from the tumor to SN (Fig 1). It showed periareolar circular lymph ducts and complicated radial breast subcutaneous lymph ducts flow. They were connected to make a network. It can show SN at only one minute after injection. By following up to 5 minutes, we can follow the lymph ducts beyond SN into the second to the fifth node groups toward the venous angle with complex plexus, observed in the surrounding anatomical architecture. The conventional lymphoscintigraphy shows only information about the existence of nodes with the uptake of RI as hot spots (Fig 2a). We injected isotope ^{99m}Tc phytate 74MBq into the subcutane over the tumor and the periareola on the day before surgery. The hot spots were observed, however, they cannot show the exact location of them on the anatomical structure and the relations between lymph ducts and lymph nodes.

SPECT-CT can show the exact location of the hot spots on the axial view of the CT image, as showing in the figure (Fig 1b). They are always coincided with the axillary nodes. However, it cannot show the lymph ducts and the relations between lymph ducts and nodes either. The number of hot spots was usually only one or two. The average number was 1.2, which was less than the number 2.3 of SN found by 3D-CT LG.

We fused the DICOM data of SPECT with 3D-CT LG by using the image fusion software (Fig 3). The hot spot can be coincided with enhanced SN observed on 3D-CT LG. However, not all of SNs had a hot spot. We call SN with a hot spot as a hot node and SN without a hot spot as a cold node. We can recognize the location

of the cold nodes by using the relation to the hot nodes on the map of 3D-CT LG.

We experienced a profitable case to show this benefit (Fig 4a). The 3D-CT LG shows the lymph duct divides into three branches and into three sentinel nodes. We call the blue stained node as a blue node and the unstained node as a gray node in the dye staining method. SPECT-fused 3D-CT LG shows that the first one is hot and blue, the second one is cold and blue, and the third one is cold and gray (Fig 3b). The metastasis was found in the second one. We can detect the forth nodes, cold and gray. It was also metastasized. However, the other axillary lymph nodes were not metastasized.

SN can be classified into four types under RI uptake and dye stainability. We summarized the number of the cases with these four types of SNs in Table 2. We have examined 3D-CT LG with RI on 32 patients and with SPECT on 20 patients. 25% of these patients had cold nodes. The metastasis was found on 6 patients. And on 2 patients the cold and blue nodes had metastases.

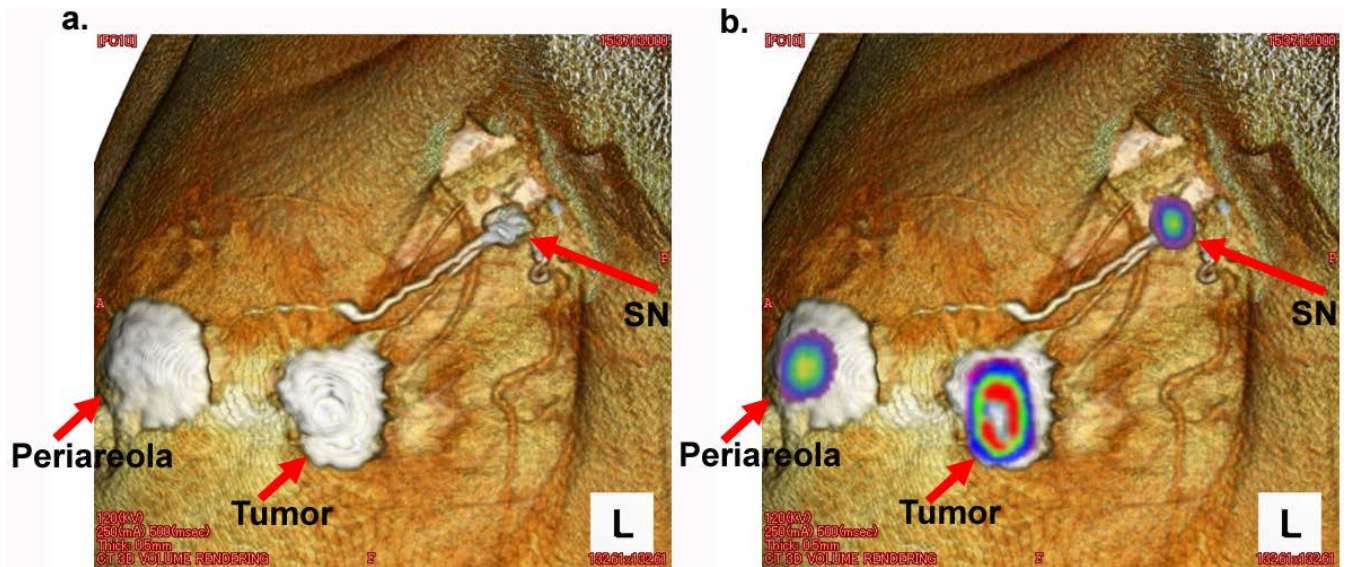


Fig.3 : a. 3D-CT lymphography (LG)

The contrast enhancing materials flow from the injected sites over the tumor and the periareola through the two lymph ducts into single SN in the axilla.

b. SPECT-fused 3D-CT LG

DICOM data of SPECT was projected on 3D-CT LG. The hot spots were coincided with SN detected by 3D-CT LG.

Fig.4 : a. 3D-CT lymphography (LG)

The lymph duct from the tumor were divided to three branches and into three SN shown as enhanced nodes (#1, #2, and #3) in 3D-CT LG. Node #4 is thought to be flown from the node #2.

b. SPECT-fused 3D-CT LG

The hot spot was observed only on the node #1. The blue stained nodes were the node #1 and #2. The other nodes were cold and gray. The node metastasis was found in the node #2 and #4.

a. 3D-CT lymphography (LG)
The contrast enhancing materials flow from the injected sites over the tumor and the periareola

Table 1 : Patient Characteristics

	3D-CT LG		RI + 3D-CT LG	
	Mean	Range	Mean	Range
Age (y/o)	54.9	26 - 82	57.4	26 - 82
Tumor size (cm)	1.9	0.1 - 10	1.4	0.1 - 1.3
	Number	%	Number	%
Tis	4	1.9	4	12.5
T1a / T1b / T1c	3 / 20 / 86	1.9 / 12.5 / 53.8	1 / 2 / 18	3.1 / 6.2 / 56.3
T2	51	31.9	7	21.9
Lymph node metastasis (N)	40	25.0	6	18.8
Distant metastasis (M)	0	0	0	0
ER (+/-)	105 / 55	65.6	26 / 6	81.2
PgR (+/-)	84 / 76	52.5	19 / 13	59.4
HER2 (+/-)	38 / 122	23.7	3 / 29	9.4
Total	160		32	

3D-CT LG: 3-dimensional computed tomography of lymphography, RI: radioisotope
ER: estrogen receptor, PgR: progesterone receptor, HER2: human epidermal growth factor receptor type 2

Table 2 : RI uptake, dye-stainability, and node metastasis

	RI	Dye	Meta
#1	+	+	-
#2	-	+	+
#3	-	-	-
#4	-	-	+

RI: radioisotope, Meta: node metastasis

Table 3 : The number of each type of SN

Nodes	N	RI		Dye	
		+	-	+	-
3D-CT LG	32	26	3	6	2
SPECT	20	16	2	4	1
3D-CT LG					

The four types of SN are classified as to RI uptaken or not, and as dye stained or not.

IV. DISCUSSIONS

We previously reported that 3D-CT LG could show the precious lymphatic architecture of the breast and the axilla, and its usefulness in SN biopsy [13, 14, 18]. It is not sure that there is only one node defined as SN. And the lymph duct from the breast and the tumor to SN is not always single. However, the lymphoscintigraphy shows an only single hot node without showing the other SNs. The other nodes adjacent to the hot node can be sampled when they are stained with blue dye. On the other hand, SN distant from the hot node cannot be sampled. 3D-CT LG shows the detailed relations of SNs and lymph ducts from the breast. It enables us to sample this distant SN. The gray nodes adjacent to SN can also be recognized as SN or not, by 3D-CT LG.

During surgery, we have to project the mapping of 3D-CT LG on the patient body. We usually mark the position of SN on the skin by oil pen at the laser pointer of CT. It is not sharp positioning because of the distance from the skin to SN in the deep axilla. The anchoring needle is often used for the non-palpable mass with calcifications in the mammary gland. It may be useful for SN marking, but it has a danger to harm surrounding vessels in the axilla. The dye injection on the SN may be useful, but it is diluted and absorbed in the tissue. It confuses the stained ducts and nodes, because we don't have enough colors of dye to be distinguished between them. The ultrasonography may find the swelling nodes. It was reported to be synchronized to the CT-LG data. It can show the location of SN, but it is disturbed by air and it cannot navigate us to find SN during surgery. Therefore, the dye injection is needed with a guidance of ultrasound. RI detector gamma probe can show the location of a hot node and navigate us to find a hot SN easily during surgery. Its location is projected on the SN mapping of 3D-CT LG. We can

sample not only these hot nodes but also the other cold SN with relative node positions indicated by SPECT-fused 3D-CT LG. The dye staining method also helps us to find the hot SNs and the cold SNs.

We have performed endoscopic surgery for breast diseases, named as video-assisted breast surgery (VABS) [19, 20]. And we have reported about the advantage of the endoscopic SN biopsy [21]. It can remove SN by a direct approach from the skin without detachment of the surrounding tissues. Therefore it becomes to be less invasive than the conventional open biopsy. It needs only 1 cm long skin incision and leaves an inconspicuous scar in the axilla. We can observe the dye stained ducts and nodes on the endoscopic view through the optical trocar Visiport. We proceed into the fat tissue of the axilla bluntly and cut thin fascia sharply by the small knife of Visiport. Even when it is difficult to find the dye because of the narrow field of vision, we can find the hot nodes easily by the RI detector gamma probe. SPECT-fused 3D-CT LG helps us to anchor these hot SN in order to navigate detecting all the other nodes on the mapping. We succeeded in the endoscopic SN biopsy on all cases.

In Figure 4, the lymph duct from the tumor branched to three and into three different SNs. Only node #2 was a cold-blue node and had metastasis. We might get into a danger of false negative study when SN biopsy was performed only with RI method. SPECT-fused 3D-CT LG presents the locational relations between hot nodes and cold nodes. SN biopsy with 3D-CT LG presents the relations between dye-stained blue nodes and unstained gray nodes. The numbers of the patients with these nodes are listed in Table 2. 25% of the patients had the cold nodes. Two patients with cold-blue nodes had metastasis in their nodes. One patient with cold-gray nodes had metastasis. They may be a cause of false negative study, but they could evade such a danger by SPECT-fused 3D-CT LG.

The fluorescence study can show the precise lymph flow in mice, but in a human study the thick subcutaneous fat tissue disturbs the permeability of fluorescence to be visualized through the skin [22, 23]. A new approach of lymphangiography has been reported by using MRI in mice [24, 25]. It can show the precise lymphatic system in the anatomical architecture. It will be helpful for us to perform the selective axillary dissection and to preserve the arm lymph channel, like 3D-CT LG. However, it needs long time to exam, so it cannot follow the rapid lymph flow as one minute after injection like CT.

V. CONCLUSION

The endoscopic SN biopsy is aesthetic and less invasive, and SPECT-fused 3D-CT LG is valuable to improve the precision of SN biopsy and to facilitate it by RI navigation.

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Evaluation of the Effectiveness of Lateral Intercrural Suture to Reduce Interdomal Distance in Order to Improve Nasal Tip Definition on Primary Rhinoplasty

By Caio Soares, Marcos Mocellin, Rogério Pasinato, Cezar Berger, Osvaldo Malafaia, Francisco Grocoske & Maria Julia Issa

Abstract- Introduction: Several surgical techniques emphasizing sutures on the lower lateral cartilage have been studied by surgeons as instruments to improve nasal tip remodeling. It is already known that the domal divergence angle and its definition angle can be modified by lateral intercrural suture (LIS). Techniques for measuring these structures are not yet standardized. and trans-operative in comparison with the third and sixth month of post-operative. Prospectivestudy.

Objectives: Assess the efficacy of LIS using polydioxanone 4.0 absorbable thread by interdomal distance measure on primary rhinoplasty and systematize lateral intercrural suture technique to improve nasal tip definition.

Results: Lateral intercrural suture (LIS) has proved to be efficient on reducing interdomal distances.

Keywords: Rhinoplasty; Polydioxanone; Suture Techn-iques.

GJMR-I Classification: NLMC Code: QZ 268



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Evaluation of the Effectiveness of Lateral Intercrural Suture to Reduce interdomal Distance in Order to Improve Nasal Tip definition on Primary Rhinoplasty

Avaliação da eficácia da sutura intercrural laterais para diminuição da distância interdomal para melhorar a definição da ponta nasal em rinoplastia primária

Caio Soares ^α, Marcos Mocellin ^σ, Rogério Pasinato ^ρ, Cezar Berger ^ω, Osvaldo Malafaia [¥], Francisco Grocoske [§] & Maria Julia Issa ^x

Resumo- Introdução: Cirurgiões têm estudado diversas técnicas cirúrgicas com ênfase em suturas nas cartilagens laterais inferiores como instrumentos de melhora no remodelamento da ponta nasal. Sabe-se que o ângulo de divergência domal e seu ângulo de definição podem ser modificados através das suturas intercrural laterais (SICL). Técnicas de mensuração dessas estruturas não estão padronizadas.

Objetivos: Avaliar a eficácia da SICL usando o fio absorvível polidioxanona 4.0 através da medida da distância interdomal em rinoplastia primária e sistematizar a técnica de sutura de intercrural laterais para melhorar a definição da ponta nasal.

Material e Métodos: Medição e análise das medidas coletadas na distância interdomal no pré-operatório, trans-operatório em comparação com o 3º e 6º mês pós-operatório. Estudo prospectivo.

Resultados: Demonstraram a eficácia das SICL para diminuição das distâncias interdomais (DID).

Conclusão: A Técnica da SICL é estatisticamente segura, eficiente, de baixa morbidade, quando aplicada em pacientes com deformidades leves e moderadas, pois diminui o ângulo de divergência dos domus, dando suporte eficaz na ponta nasal.

Descritores (Palavras-chave): Rinoplastia; Polidioxanona; Técnicas de Sutura.

Abstract- Introduction: Several surgical techniques emphasizing sutures on the lower lateral cartilage have been studied by surgeons as instruments to improve nasal tip remodeling. It is already known that the domal divergence angle and its definition angle can be modified by lateral intercrural suture (LIS). Techniques for measuring these structures are not yet standardized.

Objectives: Assess the efficacy of LIS using polydioxanone 4.0 absorbable thread by interdomal distance measure on primary rhinoplasty and systematize lateral intercrural suture technique to improve nasal tip definition.

Material and methods: Measurement and analyses of interdomal distance measures collected in the pre-operative

and trans-operative in comparison with the third and sixth month of post-operative. Prospectivestudy.

Results: Lateral intercrural suture (LIS) has proved to be efficient on reducing interdomal distances.

Conclusion: LIS is statistically safe, efficient and of low morbidity when utilized in patients with mild to moderate deformities, because it reduces the domal divergence angle, offering effective sustentation to the nasal tip.

Keywords: rhinoplasty; polydioxanone; suture techniques.

I. INTRODUCTION

Rhinoplasty is one of the most common surgeries in our field and its demand requires wider studies aiming at offer to the patient more durable, consistent, predictable and harmonic results. The nose, focus of several studies, must also present an aesthetical balance, dynamic and functional; especially because nasal tip represents the main motive for post-operative dissatisfaction. (GARCIA, 1983).¹

In addition to aesthetics analysis, the surgeon must evaluate the respiratory function in order to provide an aesthetically balanced and functionally efficient nose. (PITANGUY, 1981)²

The treatment of the nasal tip is one of the most important components on rhinoplasty, modifying its form involves mainly the control, distribution and proportion of lower lateral cartilages (LLC). The utilization of sutures on specific areas of LLC, as well as on adjacent soft tissues are particularly useful on rhinoplasty (Daniel, 1993)³, therefore is necessary the confection of permanent or semi-permanent sutures to maintain the cartilage on the intended format until the fibrosis, resulting from time and cicatrization, is well processed. All sutures that remain more than six months will probably be satisfactory, since the scar will have enough support of the LCC, after absorption of its thread. (Gruber, 1997)⁴. This concept of suture is based on otoplasty techniques for the correction of floppy ears.

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On the other hand these sutures maintain and improve structural support mechanism of the tip, considering that this area is physiologically dynamic since it moves while inhalation and exhalation, and facial expression. It works as a damper during nasal trauma and is an icon of nasal beauty and consequently facial beauty. (TORIUMI; CHECCONE, 2009)⁵

O'Neil et al. (1993)⁶ have described the domal definition angle and the domal divergence angle. This anatomic concept allows the surgeon to correlate the proportion and form of nasal tip with sutures that modify those angles, offering better definition of the nasal tip.

The domal angle is demarcated by lateral crus, and medial or intermedial crus, when there is one. The interdomal divergence angle considered normal is = 30° degrees and the domal arch <= 4 mm. (ROHRICH; ADAMS, 2001)⁷

For harmonious aesthetic lines on the nasal dorsum, slightly divergent curves must occur, starting on the superciliary arch and extending to the nasal tip definition points that correspond to the domes. A poorly defined nasal tip, such as in bulbous or boxy noses, have an angle wider than 30 degrees. When observed through a basal view it gains a square shape, and its correction includes repositioning of nasal tip definition points, domes angling and modeling of lateral crura aiming at a more triangular form from a basal view.

II. OBJETIVES

- a) Assess the efficacy of the lateral intercrural suture using polydioxanone (PDS®) 4.0 absorbable thread

- b) Systematize and describe the lateral intercrural suture to improve nasal tip definition on primary rhinoplasty with mild to moderate deformities.

III. LITERATURE REVIEW

Detailed knowledge of the nasal anatomy is the most important element for the identification of anatomic structures on the transoperative and is directly related to the choice of the surgical technique that will be utilized. The nasal tip has a variable complex structure, with anatomic structures of several shapes, consistency and volumes, intimately connected. In other words, it is composed by structures of different characteristics that function as a whole, and any alteration in one of them may affect other, resulting on different aesthetic-functional results.

The nasal lobe is an area that includes the nasal tip and is demarcated by a line connecting the upper edge of the nostrils, the supratip (breakpoint) and the anterior half of the lateral nasal wall. It is divided in tip, supratip and infratip.

The lower lateral cartilage (LLC) is the main cartilage of the nasal tip and is anatomically divided in: medial, intermedial and lateral crus. From the lateral border of the lateral crus to the pyriform aperture we have the sesamoid or auxiliary cartilages that are bonded by a fibrofatty connective tissue (Figures 1 e 2) (TARDY, 1992)⁸

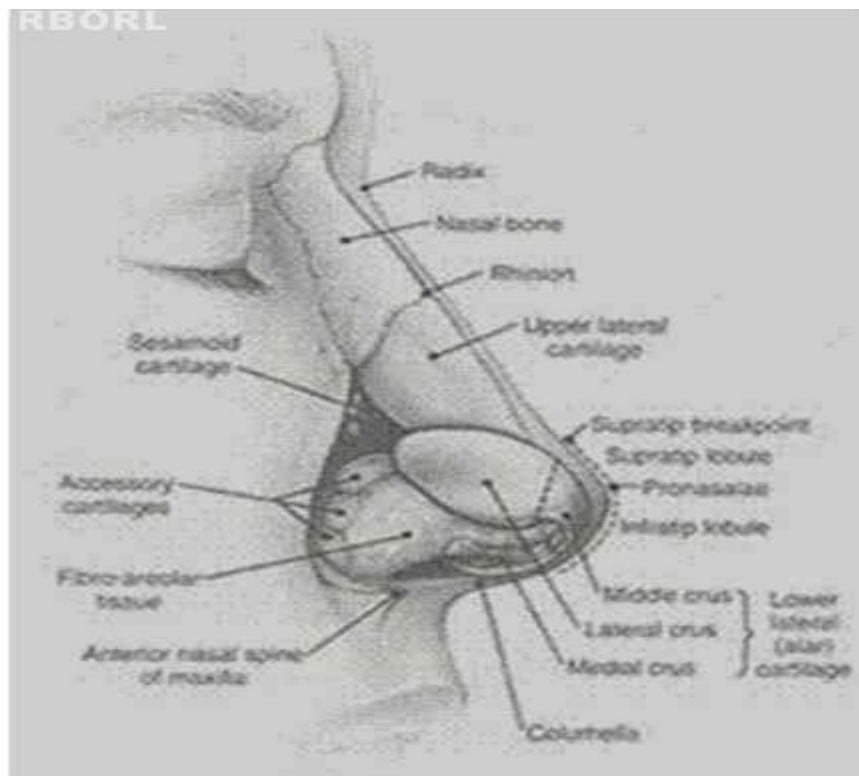


Figure 1 : Right lateral view of the nose

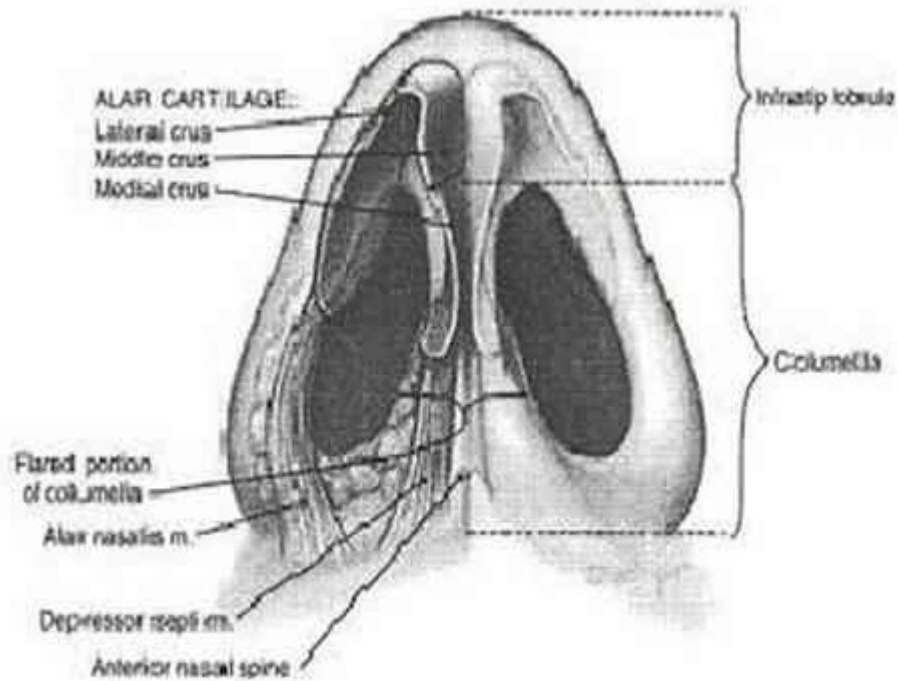


Figure 2 : View from the nasal base

The LLC is a complex and variable structure. Traditionally, were only considered the medial and lateral crura connected by the domal segment. However Sheen (1997)⁹ has introduced the concept of intermedial crus on which the domal segment would be superior. There are still some controversies about considering the intermedial crus as a single structure, but surgically there are few doubts regarding its importance on the nasal lobe configuration.

The medial crus of the LLC, consists on the base and columellar segments. O'Neal e Beil (2010)¹⁰ let

clear that that the intermedial crus is more than just a connection between the medial and lateral crura. It has a complex structure and therefore important for the nasal lobe.

Most of the patients present an angulation in two planes: the cephalic rotation angle the basal divergence angle of the base of the medial crura of the LLC that can be observed on the base incidence (Figure3).

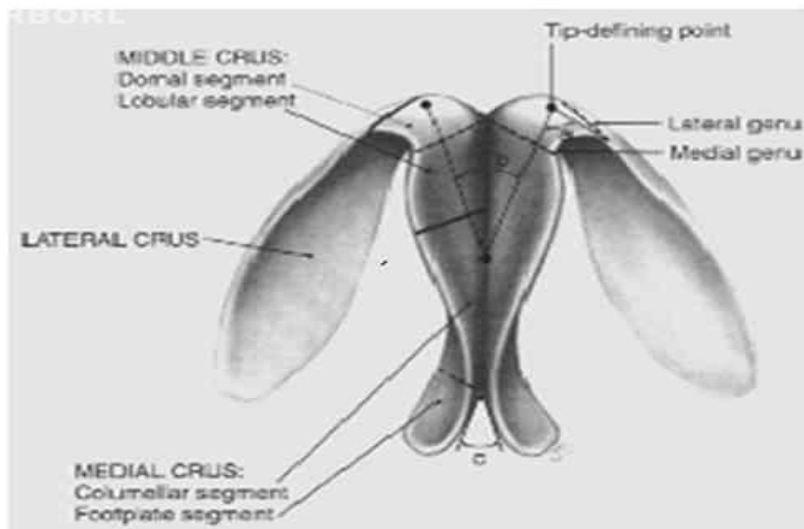


Figure 3 : Basal view of the nose presenting the domal divergence and domal definition angles; a) domal definition angle. b) domal divergence angle c) base divergence angle.

These angles affect the shape and the protuberance of the large part of the columela. The amount of soft tissue, as well as the caudal portion of the septum, interferes on the projection of the nasal tip. Anatomically the columellar segment begins on the upper limit of the basal segment and ends on the columellar breakpoint, where the intermedial crus of the

LLC starts. Variations on the width of the columellar supratip occur frequently. On the lateral incidence the more convex portion of the columela corresponds to the same columellar breakpoint, corresponding to the junction of this segment with the intermedial crus. The more acute these angulation, more elongated the columela will be. (Figure 4)

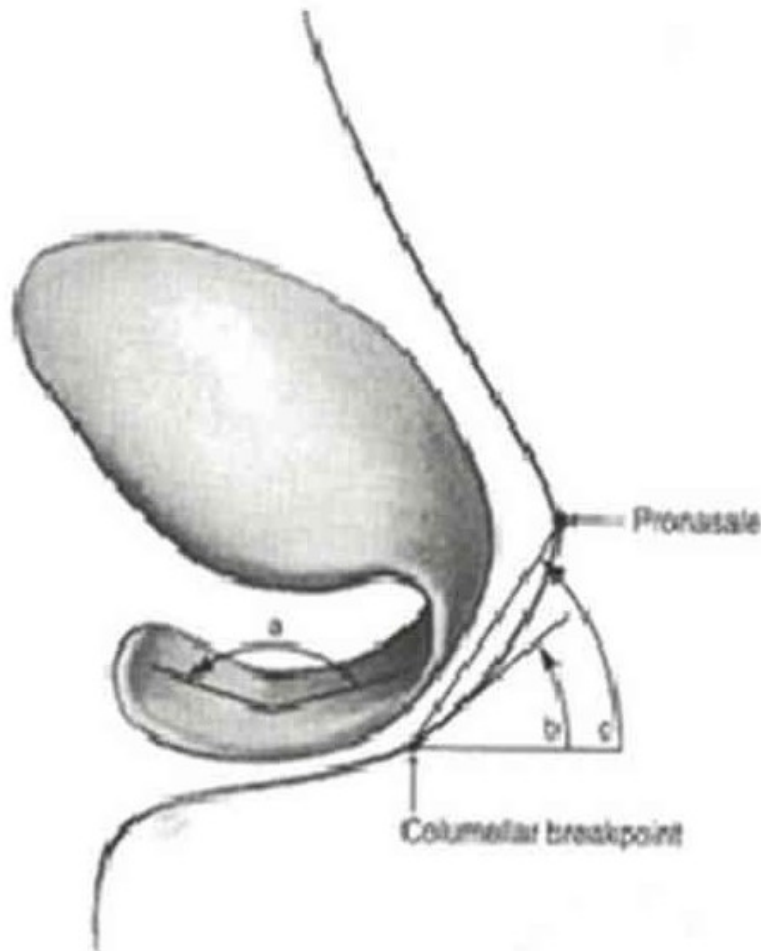


Figure 4 : Lateral view of the lateral cartilage: a) cephalic rotation angle, b) Columellar angle, c) angle of tip rotation

The intermedial crus combine the lobular and domal segment, or simply the dome. Lobular segment has a more variable structure, however exerts less influence over the external appearance since normally it is covered by a great amount of soft tissue. Its width and angle determine the shape and protrusion of the infratip.

Domal segment on other hand stays more visible because it is covered only by a small portion of soft tissue and by thin skin. Daniel (1992)¹¹ describes two curvature on the domal region: a) convex, where the domes form a gentle triangle that is important to the harmony of the nostril apex, where cartilage and skin have direct contact; b) boxy nose characterizing poor definition of the nasal tip c. concave forming a double dome, that is less frequent.

The lateral crus is the larger component of the nasal tip and shapes the upper and anterior portions of

the alar wall. Medially it is continuous to the domal segment of the intermedial crus, and laterally to the accessory cartilages on the pyriform process region. Its caudal border offers support and definition to the anterior alar edge. Laterally it curves in a cephalic way becoming wider. Surgically the approximation between the lateral crus increases the projection of the nasal tip, and simultaneously gives it a better definition, distinguishing the supratip. Zelnick (1979)¹² has mentioned in his studies that, when the portion adjacent to the dome is concave, this promotes its definition, requiring a minimum modification of the lateral crus. However, it is known that the nasal tip definition is a subjective characteristic for which there is no exact formula to obtain a standard shape.

The scroll region is the junction of the cephalic border and the lateral crus of the LLC. Usually the

caudal border of the upper lateral cartilage (ULC) has a slight lateral curve and LLC has a curve towards the bottom resulting on a lifting of the LLC over the upper lateral crus (ULC). The wider the curve of this area, greater the bulbosity of the nasal lobe will be resulting on a poor definition.

Daniel (1992)¹¹ affirms that in order to improve the nasal tip definition we should convert the convex lateral crus into concave, and by this way highlighting the dome definition, where the tips, aesthetically adjusted, would give the characteristics of a convex domal segment and a concave lateral crus.

Sheen (1997)⁹ has analyzed what would be the ideal nasal tip shape, and described it as two equilateral triangles with a common base made by the line that unite the domes. Therefore he named it intercrural distance,

the distance between the two domes that coincide on the common base of the triangles.

Assessment of asymmetry and concavities using tridimensional figures was performed by Toriumi (2006)¹³, to document precisely the spot of imperfections that are emphasized by shadows that impact over nasal aesthetic contour. From a front view there are criteria for a subtle transition from the lobe to the wing. Thus concludes that tip definition points are horizontally enhanced with tenuous shadows above and beneath it, with two opposite horizontal curvy lines outlining the tip enhancement. The exact configuration of this enhancement varies among each patient, but on most of the female patients the width is of 8 mm varying from 6 to 14mm. These values are a little higher on men. (Figure 5)

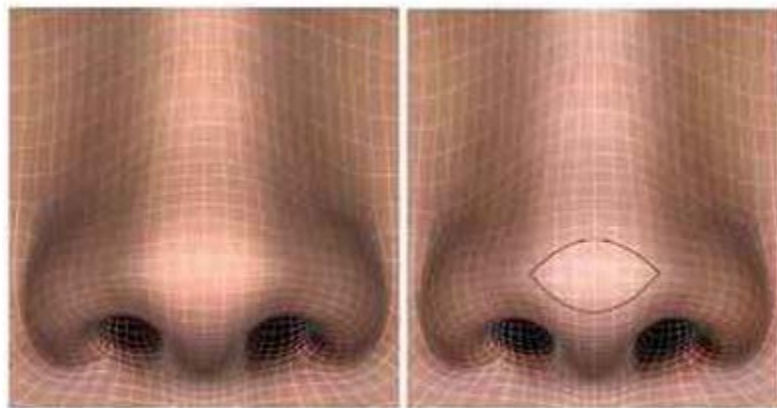


Figure 5 : Analysis performed by Torumi presenting what would be a favorable contour from an anterior view. a) Subtle transition from the lobe to the wing. B) Two opposite horizontal curvy lines outlining the nasal tip enhancement

On oblique view there is a light shadow on the supratip break that continues along the supra alar notch. When we decide for a cephalic resection of the LLC, we cause the break of the supratip that descend on a frontal view resulting on a better definition of the nasal tip. The contour of the infratip break also becomes important to improve natural aesthetic aspects.

From a base view, the cartilage arch must have a triangular shape free from pinching. The soft tissue triangles must be bland. On a lateral view the nasal tip must be a little above the dorsum with a slight break of the supratip. These shadows are intensified on the soft tissue triangle. What brings us to the conclusion that to be well defined a nasal tip should have a supratip and an infratip break, being the supratip defined by the junction of the lobe and the nasal dorsum and the infratip by the junction of the lobe with the columela. On the transition of these regions there must be a gap highlighting the lobe from the tip and nasal dorsum.

Yet it is worth noting that the nasal dorsum aesthetic line, from the eyebrow to the tip, must be soft and its surface free from roughness. (Figure 6)



Figure 6 : Aesthetic line of the nasal dorsum

There is a firm transversal connective tissue that unites the medial and intermedial crura. Previously, it would form the interdomal ligament that founds cephalically with vertical and longitudinal fibers of the overlying dermis forming what Pitanguy (1981)¹⁴ describes as dermo cartilaginous ligament of the nose. This ligament would make the superficial connection helping the dynamic balance between the dorsum and the tip of the nose. Therefore its section would result on a cephalic release of the nasal tip, especially in round noses.

According to Tebbetts (2003)¹⁵, the Strong unification of the medial and intermedial crura by the fibrous tissue would provide a unique functional structure, composed by the lateral crura of the LLC, a sustenance tripod to the nasal tip.

The thickness of skin requires especial attention on a rhinoplasty surgical plan. Usually the skin tends to be thinner on the upper half of the nose and thicker and more adherent on the posterior half. Thicker skin disguises greater defects, but also soothes surgical corrections. Oiliness produced by the sebaceous glands on the nose tip difficult its definition, mainly on ethnics or non-Caucasian noses. On elderly patients modification of cutaneous characteristics can also be responsible for some alteration typically related to ageing, such as nasal tip drop or lengthened nose.

IV. MATERIAL AND METHODS

The present study was approved by the ethics committee under the number CAE 0182.0208.000-11.

a) Sample Characterization and Research Site

The present experimental prospective study was performed between March of 2010 and 15th of

November of 2011. In addition to theoretical research, the present study was composed of four basic protocols:

- Selection of target population according to criteria of rhinoplasty indications associated or not with septoplasty.
- Clinical control of the interdomal distance on pre-operative, transoperative and post-operative periods, with control and measurement at and interval of 90 to 180 days respectively.
- Photographic control and measurement of interdomal distance
- Control, assessment and interpretation of the collected data and statistical results.

At this step the electronic protocol SINPE® (*Sistema Integrado de Protocolos Eletrônicos*) to collect and hierarchize the research steps that corresponded to: anamnesis, physical exams, complementary exams, diagnosis and surgical treatment.

The average interdomal distances were compared during different operative stages from the whole group, genders and skin types of target population utilizing statistical Mann-Whitney test. The adopted significance level was $p \leq 0.05$.

b) Selection of Patients

For the development of this study 54 patients with rhinoplasty indication to improve nasal tip definition through lateral intercrura, were selected. Among the main indications for the use of suture technique, the criteria of minor and moderate deformities, meaning, domal divergence angle wider than 30 degrees, normal domal arch smaller or equal to 4mm or moderately wider, larger or equal to 4mm, were the parameters to select the target population. (Figures 7 and 8)

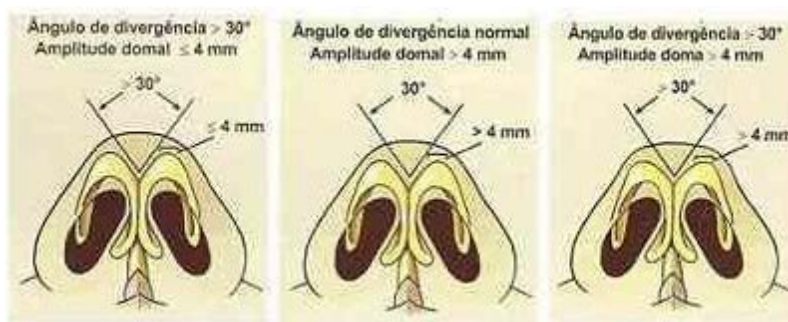


Figure 7: Diagram indicating possible variations of nose tip types considering the variables: domal divergence angle and domal wideness according to Gunter

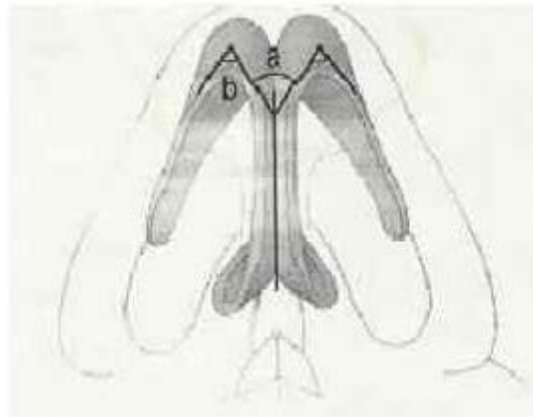


Figure 8 : a) domal divergence angle; b) domal definition angle

Contraindications to the performance of the lateral intercrural suture include anatomic situations in which the domal divergence angle is preserved. Situations as the narrow nasal tip, asymmetric, excessive bulbosity, hyper-projected nose with excessive nasal rotation and congenital anomalies are also among the contraindications. Patients with rounded nasal tip, bifid lower lateral cartilage, and weak lower lateral cartilage and with improper support and other conditions also require a careful evaluation.

c) Photographic Evaluation

Photograph study was performed with all patients with photos taken from the following views: frontal, base, submental, left and right oblique, left and right profile, at rest and smiling. The utilized equipment was a digital NIKON B90 with AF-S NIKKOR 18-105 mm, lenses and neutral background.

For the frontal position register the patient was standing while the surgeon (observer) framed the whole face, including the ears in the image. For the base view picture two images were captured: one with the nasal lobe alignment with the medial corner of the eyelid as parameter, and the other one with the tip of the nasal lobe aligned with the glabella. Left and right oblique vision must be vertically aligned, the nasal lobe tip meeting the pupil of the contralateral eye.

The distance for capturing the photographic images was standardized at 1m between the camera lens and the nasal tip, using a fixed lens with a 100mm zoom in order to avoid distortions. The focus was placed on the nasal tip. Results were assessed by a comparison between photographs from pre and post-operative periods.

Other aesthetic parameters such as: projection and rotation of the nasal tip, nasal base proportion, upper and middle thirds of the nose, were not assessed in this study. The skin of the nose tip was classified as thin, medium and thick according to the surgeon subjective assessment. Data were stored on SINPE© protocol.

d) mensuration of the interdomal distance

The method used to assess the efficacy of these suture technique was the palpation of the lower lateral cartilages, identifying the left and right domes of the nose and measuring the distance between them (IDD) with a beam compass ranging from 0 to 20mm. The exact point of measurement was the midpoint between cephalic and caudal borders of the lower lateral cartilages on the dome level. Those distances were measured on the pre-operative, transoperative and after 3 and 6 months intervals on the post-operative.

Complications and interurrences were registered at all post-operative appointment. Data collection was made according to the SINPE© specific protocol. Post-operative photos were taken under the same conditions described above during routine appointments on the third and sixth month after the surgery.

e) intercrural suture surgical techniques

Lateral intercrural suture (LIS) technique is performed after lateral osteotomies. For a better visualization of the lateral crura, the Millard thimble was used with one of the hooks placed to coincide with the dome. Remind that the distance between the hook and the thimble is of 10mm. Anesthetic solution of xylocaine: adrenaline 1:100.000 is infiltrated using an insulin needle in order to achieve hemostasis and hydraulic dissection separating the vestibular skin from the cartilaginous portion of the lateral crus.

With a 15 blade a cutaneous incision is made, from medial to lateral, having the vibrissae caudally line as reference, and like this making a bi-pedicle flap on the medial and lateral vestibular skin using Converse angled scissor. (Figure 9)



Figure 9 : Transoperative. Dissection with confection of bi-pedicle flap on the medial and lateral vestibular skin using Converse angled scissor

The evaluation of the removed quantity of the cephalic portion of the lateral crus of the LLC is also measured using the same beam compass. The parameter to maintain the cartilaginous arch intact, without interruption, is to preserve 5mm on the medial portion and 7mm on the lateral portion. (Figure 10)

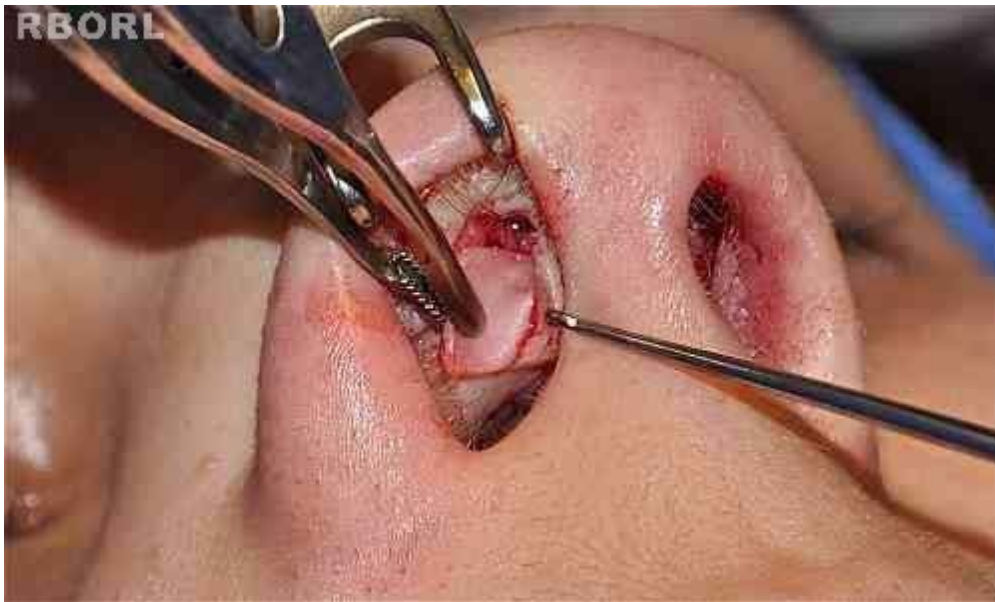


Figure 10 : Transoperative: Cephalic portion of the removed right lower lateral cartilage

Using the same blade, these surgical steps are repeated on the contralateral area. Le Garde maneuver was performed. La Garde maneuver that consists on the displacement of the soft tissues and connective tissues between lobular skin and lower lateral cartilages. (Figure 11)



Figure 11 : Transoperative. Maneuver of disruption of the soft tissues and connective tissues between lobular skin and lower lateral cartilages

At this moment the exact point, where the lateral intercrural suture will be performed, is marked on the lateral of the dome, using gentian violet. This distance varies according to the spot that, supposedly can offer better anatomic results, aiming at diminishing the domal divergence angle and consequently approxi-

mates the domes. These distances can vary between 2 and 4mm.

Then a sharp needle with 19mm f PDS 4.0 thread is inserted at cephalo-caudal direction in the left LLC (Figure 12).



Figure 12 : Transoperative: 3 mm lateral to the dome a sharp needle with a 19mm(PDS®) 4.0 thread is inserted on cephalo-caudal direction in the left LLC



Through the transfixion incision, the thread is transferred to the other side, placing the needle on the inverse direction, caudal-cephalic, in the right LLC at the

same distance lateral to the contralateral dome (Figures 13 e 14). The same needle is passed through the transfixion incision to the left nasal cavity (Figure 15).



Figure 13 : Transoperative. Through the transfixion incision, the needle is passed to the right nostril



Figure 14 : Transoperative. The maneuver is repeated on the inverse direction, caudal-cephalic, 3mm laterally to the right dome



Figure 15 : Transoperative. The same needle is passed through the transfixion incision to the left nasal cavity

The knot grip is made progressively and gradually with previous simulation and visual parameter. It is important to mention that the knot must be centralized between the domes (interdomal space) with similar distances so that there are no asymmetries on

the nasal lobe after the grip and knot tightening (Figure 16). A minimum of three knots is necessary, and a slight hypercorrection on the approximation of the domes is recommendable.



Figure 16 : Transoperative. Hemostatic clamp was used. The not must be centralized on the interdomal space



The last step includes the performance of the three septo-columelar sutures also using PDS 4.0. Once the surgery is completed, using the beam compass the

new interdomal distance is registered. When compared to the pre-operative distance, this distance should be smaller (Figures 17, 18, 19).



Figure 17 : Preoperative photograph (basal view)



Figure 18 : Photograph at transoperative period with gentian violet and beam compass indicating the approximation of the 13mm dome reaching 8mm (basal view)



Figure 19 : Photograph at the transoperative period indicating the decrease of the divergence angle between the domes, resulting on a better definition of the nasal tip

It is important to verify the efficacy of the dome harmonization with the aesthetic line of the nasal dorsum from an upper view (Figure 20).



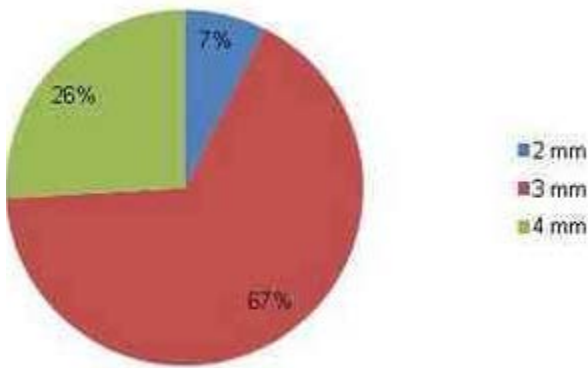
Figure 20 : Comparison of photographs from pre-operative (A) and transoperative (B) periods indicating the harmonization of the dome with the aesthetic line of the nasal dorsum

V. RESULTS

Average age was 26.4 years, minimum age of 14 and maximum of 62, and 44% of the sample (26 patients) were between 21 and 30 years. Only two patients (3%) were between 51 and 70 years old.

Only one intercurrence (1.9%), was observed, an infection on the nasal tip and there were no major complications. After clinical treatment using antibiotics there were no functional or aesthetic sequels.

The area where intercricular suture was performed was of 3mm on 66.7% of the cases, at 4mm on 25.9% and in only 7.4% the suture was performed at 2mm lateral to the dome (Graphic 1).



Graphic 1 : Suture placement lateral to the dome 54 pacientes

During pre-operative phase the average interdomal distance was of 12.3 mm varying between 10 to 16 mm, as presented on table 1. On transoperative period the average has decreased to 8.1mm, with variation from 6 to 10mm, and at the three month post-operative there was an increase on this distance reaching an average of 8.8mm (7-11m). After six months the average was 9.1mm (7-11mm). (Table 1)

Table 1 : Comparison of the Interdomal Distances (Mm) Among the Several Operative on the Complete Group

OPERATIVE PHASES	n	INTERDOMAL DISTANCE (mm)				Mann-Whitney Test p
		min-max	average	sd		
Pre	54	10-16	12.3	1.6	0.0000	
Trans	54	6-10	8.1	0.9		
Post: 3 months	54	7-11	8.8	1.1		
Post: 6 months	54	7-11	9.1	1.0		

Note: n –number of patients; min-max –minimum and maximum values; sd –standard deviation; p –statistical significance level

The comparison of the interdomal distance averages between genders at different operative stages indicated an average of 12.33mm (10-16mm) for women and 12.5mm (12-13mm) for men. At the transoperative the average was of 8.0 mm (6-10mm) and 8.5mm (8-9 mm) respectively for women and men. And at the third

month of post-operative period 8.8mm(7-11 mm) for women and 9.0 mm (8-10 mm) for men. The results were, at the sixth month of post-operative, of 9.1mm(7-11 mm) and 9.5 mm (9-10 mm), for women and men respectively. (Table 2)

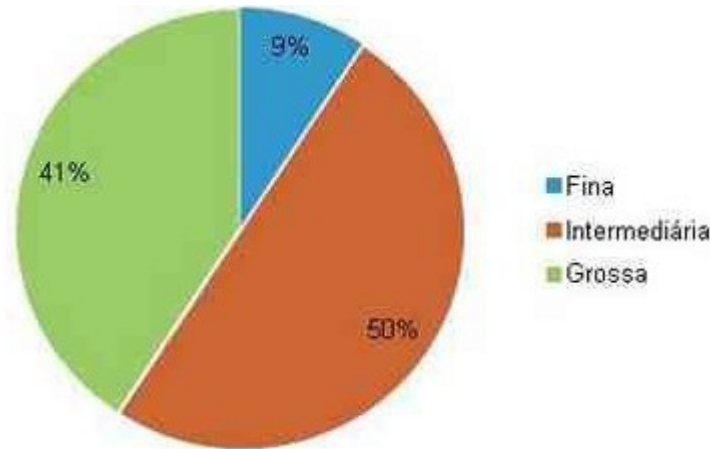
Table 2 : Comparison of the Interdomal Distances (Mm) Between Genders at Several Operative Phases

OPERATIVE PHASES	GENDER	n	INTERDOMAL DISTANCE (mm)				Mann-Whitney Test p
			min-max	average	sd		
Pre	feminine	50	10-16	12.3	1.6	0.71	
	masculine	4	12-13	12.5	0.6		
Trans	feminine	50	6-10	8.0	0.9	0.20	
	masculine	4	8-9	8.5	0.6		
Post: 3 months	feminine	50	7-11	8.8	1.1	0.71	
	masculine	4	8-10	9.0	1.2		
Post: 6 months	feminine	50	7-11	9.1	1.1	0.32	
	masculine	4	9-10	9.5	0.6		

Note: n –number of patients; min-max –minimum and maximum values; sd –standard deviation; p –statistical significance level

Regarding skin type, twenty seven (50%) had skin of medium thickness. There were twenty two patients with thick skin (41%) and 5 (9%) had thin skin (Graphic 2). The average interdomal distance on patients with thin skin, at the pre-operative, transop-

erative and at the sixth month of post-operative were respectively 10.4 mm, 7.8 mm, and 8.8 mm. Therefore there was a slight increase of 1.0 mm when comparing transoperative period to the post-operative sixth month result.



Graphic 2 : Skin types: 54 patients

For patients with medium skin thickness the measures of this same distance were: 12.3mm at the pre-operative; 8.1 mm at transoperative; 9.4 mm at post-operative sixth month. This comparison indicates an increase of 1.33 mm from transoperative to the final result. The comparison of the results on patients with

thick skin shows measures of 12.7, 8.0mm and 8.8 mm respectively for pre-operative, transoperative and the sixth month of post-operative. Interdomal distance on the final result has increased in 0.8 mm in relation to transoperative period (Table 3).

Table 3 : Comparison Of The Interdomal Distances (Mm) Among Skin Types At several Operative Phases

OPERATIVE PHASES	SKIN TYPES	n	INTERDOMAL DISTANCE (mm)				Mann-Whitney Test
			min-max	average	□	sd	p
Pre	thin	5	10-11	10.4	□	0.5	0.002
	medium	27	10-15	12.3	□	1.1	
Pre	thin	5	10-11	10,4	□	0.5	0.01
	thick	22	10-16	12,7	□	1.9	
Pre	medium	27	10-15	12.3	□	1.1	0.32
	thick	22	10-16	12.7	□	1.9	
Trans	thin	5	7-9	7.8	□	0.8	0.35
	medium	27	6-10	8.1	□	0.9	

Note: n –number of patients; min–max –minimum and maximum values; sd –standard deviation; p –statistical significance level

An example of the comparative results of pre and post-operative periods, six months follow-up, of intercrural suture technique with cephalic resection of the LLC, at 3mm lateral to the dome in patients with thin skin, shows a better definition of the nasal tip due to the reduction of the interdomal distance (Figures 21 and 24).



Figure 21 : Pre-operative anterior view



Figure 22 : Post-operative anterior view



Figure 23 : View of the right profile at the pre-operative period

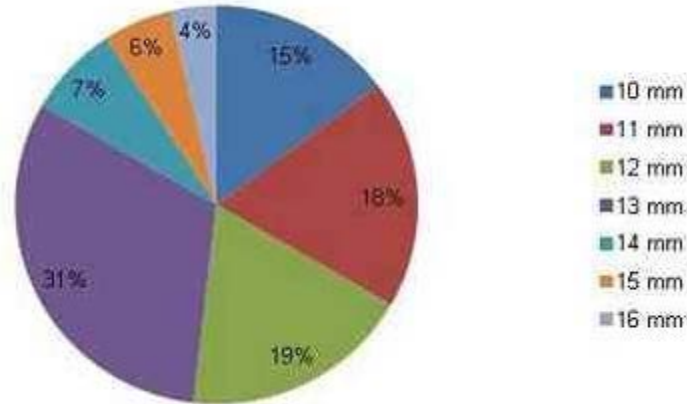


Figure 24 : View of the right profile at the post-operative period

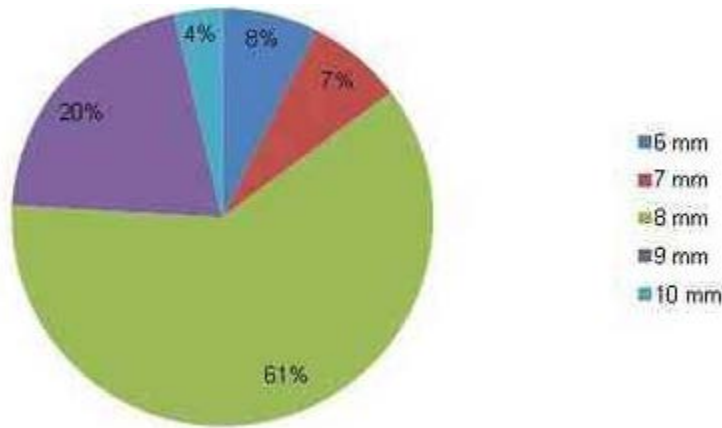


Regarding interdomal distance at pre-operative phase of 54 patients, most of them (31%) presented a 13 mm distance; in 19% the distance was of 12 mm and in 18% of 11 mm (Graphic 3). Graphics 4 and 5 illustrate the interdomal distance at transoperative and sixth post-operative month respectively. It was noted that 61% of

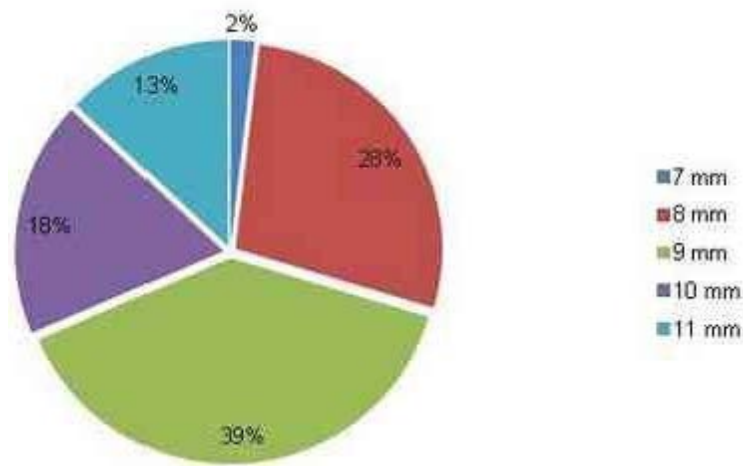
the foresaid measures reached 8mm at this transoperative. At the sixth month 29% stayed at 9 mm; 28% at 8 mm; and 18% at 10 mm. Therefore, most of the patients 85% presented interdomal distance measuring between 8 and 10 mm.



Graphic 3 : Pre-operative interdomal distance: 54 patients



Graphic 4 : Transoperative interdomal distance: 54



Graphic 5 : Post-operative interdomal distance–after 6 months: 54 patients

VI. DISCUSSION

Surgical treatment of the nasal tip is one of the most important and challenging aspects of rhinoplasty. The management of the nasal tip shape involves great part of the anatomy of the lower lateral cartilages, and requires knowledge of aesthetic standards. The aim of this procedure is to correct the nasal tip structure by narrowing it to a harmonic definition of its contours and without interfering on the nasal function.

For many years nose tip surgery utilized aggressive techniques with wide resections or interruption of the alar arches, that may result on sequels, especially those related to sustentation and therefore to secondary deformities. Cartilage sutures on the other hand are a viable alternative to alterations of the nasal tip preserving anatomic structure and improving structural support mechanism. The first suture performed on nose tip was described by Joseph at 1930 (Joseph; Raghu, 2006)¹⁶. Along the two last decades, ideology among surgeons has changed very quickly, emphasizing sutures as technique for nasal tip remodeling. The control of the tension of the suture can reduce the convexity of the dome and result on concavity of the lateral crus of the LLC. (Corrado; Bloomm; Becker, 2009)¹⁷

Most of those techniques aim at narrowing the tip, applying the suture precisely on a strategic spot approximating the domes and reducing its divergence angle. Sutures to create a new antihelix on otoplasty described by Mustarde, resemble the technique of sutures in the nasal tip, on which bends and angled alterations can be performed (Toriumi, 1995)¹⁸. These techniques are safer and reversible. The use of sutures to improve nasal tip definition is a world tendency at endonasal rhinoplasty (Tebbetts, 2003)¹⁹. Final results of the suture may be influenced, mainly by the intrinsic force of the cartilage, its thickness; by the grip of the suture; limitations imposed by soft tissues, ligaments, amount of subcutaneous tissue and skin density.

The characteristics of the skin are determining factors for lateral intercrural suture efficacy. Patients with thin skin with lack of subcutaneous tissue present more expressive results. On patients with thick skin and excessive subcutaneous tissue the LIS can present low effectiveness if compared to other techniques such as transdomal suture using semi-open rhinoplasty (delivery), or alar lateral spanning (Lo; Rowe-Jones, 1984)²⁰. Therefore the choice of the applied technique must be made according to the skin type and the amount of subcutaneous tissue.

LIS is indicated mostly for noses with thin or medium skin and aim at correcting deformities with an increased divergence of the domal angle, such as bifid tip, boxy tip, or round tip, with poor definition (Patrocínio et al., 2009)²¹. Nasal tips with more complex deformities, such as hyper-projected, asymmetric, congenital or with

thick skin, disproportion between cartilage thickness and the amount of subcutaneous tissue, require grafts or division of the dome to adequate definition and narrowing of the nasal tip (Simons, 1987)²². Authors agree that the improvement of nasal tip definition should consider the utilization of conservative techniques for discrete alterations on patients with thin skin, and use more aggressive techniques for severe deformities. (JANG, 2008)²³

The success of the LIS depends on the previous knowledge of its indications. The surgeon must consider the several options of suture techniques to refine nasal tip since each nose has a variable anatomy and its harmonization may require distinct procedures. These procedures are not indicated for patients with ethnic noses, such as the Asian, that present certain limitations. In these cases the use of strut, medial intercrura and nasal tip graft (GUNTER; FRIEDMAN, 1997).²⁴ There isn't a better technique for nasal tip definition and refinement, but different efficient methods that must be customized according to the experience of the surgeon that executes them. (NEDV, 2009)²⁵

It was observed that on the LIS sutures placed on distances more laterally to the dome, up to 4mm, have distinct aesthetic results. The more definition required, more on the lateral the suture must be performed. Even not being the object of this study this suture may affect rotation and projection of the nasal tip.

According to Toriumi (1995)¹⁸ and Tardy (1987)²⁶ the cartilage suture techniques have been widely applied due to the low index of complications in comparison to cartilaginous arch interruption technique.

The building with reposition of the domes is efficient with LIS. According to data on the literature, chances of extrusion of the thread PDS® 4.0 are very low (Corrado; Bloomm; Becker, 2009)¹⁷ Most complications reported are inadequate selection of patient or technical errors as asymmetric appliance of the suture. Therefore pre-operative analysis is essential.

In the present study was observed only one case (1.9%) of infection due to the suture, at acceptable levels according to the literature (Pitanguy, 1965)²⁷. Furthermore it is well known that PDS® ethicon (polydioxanone) is completely absorbed after approximately 180 days. The absorption is considered slow but has the possibility of spontaneous resolution or with conservative clinic treatment using antibiotics as verified on this study.

In addition to infection, literature also reports scar retraction, abnormal tip rotation, extrusion of the suture, projection alteration, excessive narrowing of the tip, concavity of the lateral crus, supratip characterization, pinching and valve insufficiency.

Cephalic resection of the LLC is one of the most utilized techniques to reduce the width of lateral crus, and was applied in all cases in order to obtain standardization. Access was transcartilaginous as

described by Converse, preserving the cartilaginous arch respecting a minimum of 5mm on the medial portion, next to the dome and 7mm on the lateral following the standard described by Pedroza (2002)²⁸ on the New Domes technique. Excessive removal may result on inconveniences such as loss of support of the lateral crus leading to a pinching of the tip. We consider important the maintenance these measures to preserve the support of the lateral crus, on which a sharp 1.9 cm needle was used. The grip of the knot must be gradual and always at the most natural position of the domes.

Symmetrical cephalic resection of the LLC associated to LIS must have a striking and attractive aspect favoring the preservation of the triangle creating a more gracious transition on the scroll area and nasal contour, especially from a frontal view. The result would be the harmony of the aesthetic line of the nasal dorsum that must have slightly divergent curves from the supraciliary region to the nasal tip definition spots. (FRIEDMAN; AKCAM; COOK, 2006)²⁹. All the patients had compatible symmetry regarding that aspect.

The maneuver described by Le Garde, that consist on the displacement of the soft tissues that connect the lower lateral cartilages to the skin, are of great importance, because they provoke secondary lobular cicatricial reaction, leading to an improvement of the harmonization of the nasal tip. It also allows the approximation and consequent reduction of the interdomal distance. The knot stays concealed at the medial line, equally distant from the dome, named interdomal space. If this does not occur asymmetry may become evident.

It is observed the necessity of more conservative surgical approaches to correct deformities on the nasal tip. We consider the endonasal access on most cases, especially at the south of Brazil where there is a prevalence of Caucasian noses, therefore requiring less reduction surgeries. Endonasal access through inter-cartilaginous incisions and septo-columellar transfixation is considered less destructive in comparison to semi-open and opened access. However, due to miscegenation a significant part of the population have noses with "mestizo noses", and in these cases there is a reduction of its structure associated to the increase on the skin thickness and subsequent poor definition of the nasal tip, and the LIS is an option for surgical treatment.

Among the disadvantages of open rhinoplasty is the larger post-operative edema and due to the dissection of the skin there can be scar retraction distorting the reconstructed osteocartilaginous structure. (Gruber; Weintraub; Pomerantz, 2008)³⁰. Indiscriminate fat removal must also be avoided since it is known that it increase the risks of necrosis and skeletonization of the LLC. Although it is not common, transcolumellar unaesthetic scar must be considered, however

advantages such as better anatomic visualization and its intercartilaginous relation are prioritized by some surgeons. We prefer endonasal rhinoplasty but we have to look for results similar to those obtained through open technique. Indications to closed surgery have increased and are proportional to indications for closed and semi-open technique. The learning curve and the comparison of results in the present study indicates the efficacy of the LIS.

Medical literature reports several techniques to structure and definition of the nasal tip, and they can also vary according to the preferences of each surgeon regarding suture threads. We have utilized colorless polydioxanone (PDS®) 4.0 with 19 mm sharp needle that has slow absorption characteristics. Gruber et al. (2008)³⁰ had effective results utilizing colorless PDS® 5.0. Tardy and Chemy (1987)⁴³ on the other hand prefer colorless nylon® 4.0 to redirect the domes of the LLC, but there are no mentions in their studies about this slight compensatory hypercorrection.

Possibilities of extrusion of the suture thread are reduced when the knot is equidistance from the domes and covered by subcutaneous tissue layer under the skin. Unabsorbable suture with nylon® forms a minimum inflammatory reaction that devolves to a cicatricial fibrosis. After some time there is a small loss of tensional force. Similar reaction also happens with polypropylene (Prolene®) utilized by Pedroza (2002)²⁸ on its New Domes Technique. Polydioxanone is completely absorbed after approximately 180 days, giving enough time for cicatrization. The inconvenient is that, after approximately 4 weeks, it begins to lose gradually its tensional force that, according to the manufacturer, can be reduced to 50% in this period (ETHICON, INC. Johnson & Johnson Company). Another alternative would be the Polydioxanone (PDS®3.0) considered more efficient regarding tensional force, with a 60% loss in 42 days. In the present study was verified that a slight hypercorrection with interdomal approximation of 1 mm more than the necessary must be performed, considering the structure and thickness of the LLC; the amount of subcutaneous tissue, skin thickness and that the more lateral the dome more tension will be necessary. Poliglicaprone (Monocryl®) would be another option, but, according to the manufacturer, its total absorption is faster, from 91 to 119 days. Thus there is no ideal thread and surgeons must be critical, particularly about absorption and loss of tensional force. Therefore more precise measurements comparing these measures at pre-operative and medium and long term post-operative are required.

Comparative studies with several threads must be performed and are fundamental to systematize techniques of sutures on the nasal tip on primary or revision rhinoplasty. Other parameters such as stabilization degree, and cartilaginous support,

symmetry and objectives relative to tip projection must also be analyzed

We prefer to measure the exact spot, lateral to the domes, than place the needle for further grip of the suture. Tebbetts¹⁹ described at 1994 the lateral intercrura suture placing the needle on the middle third of the lateral crura. Likewise the present study, the author is critical in relation to the knot placement that must be at a centralized and symmetric position. The grip must be controlled to prevent excessiveness tension narrowing overmuch the nasal tip, increasing the concavity of the lateral crura. These sutures progressively force the lateral crura to move medially, thus the domes will be dislocated to a more caudal position with a little alar retraction.

Depending on the intrinsic forces, this suture may also result on a concavity of the alar edges and therefore requiring alar grafts. Was noticed in this study that when it is necessary to reduce the interdomal distance,, the suture must be performed on the anterior portion of the dome (Gunter, 1997).³² Another peculiarity that we have observed was that for poor defined tips the LIS should be placed on the lateral of the dome, at 4mm for example. Alar or domal arches wider than 4mm or unsupported cartilage can also benefit from this technique, because in these cases there is a lengthen of the medial crura that leads to a length of the columela. It was concluded that before gripping the knot the surgeon must look at the nose from a tridimensional view, so that when necessary he can change the local on the future.

We have performed this technique using simple suture, however McCollough and English (1985)³³ have reported at 1985 a technique aiming at tip projection and consequent definition using a single horizontal suture connecting the 4 crura to the morcellized domes. Other technique that deserves to be pointed out was published by Tardy and Chemy (1987)³⁴ and consists on a previously mentioned modification technique that resect interdomal fibrous soft tissue. Gruber et al. (2008)³⁰ have reported on their study that the horizontal suture approximation must not be inferior to 10 mm approaching the domes preserving the natural bifid aspect. Our study has achieved an interdomal distance of 8.1 mm at the transoperative evolving to 9.1 mm at the sixth month of post-operative period, confirming this report.

About open access, Gruber et al. (2008)³⁰ concluded that the suture between the LLC is more precise, however they do not reject closed rhinoplasty technique or semi-open technique (Guyuron; Behmand e Ramin, 2003)³⁵ with similar results. In the present study all LIS were performed using endonasal technique.

Evaluating the quantity of sutures to be performed single suture is considered efficient, but the necessity of a second or third complementary suture to achieve the desired effect must not be discarded

(Guyuron; Behmand e Ramin, 2003)³⁵. A parameter would be a tenuous residual convexity of the lateral crura.

Leach e Athré (2006)³⁶ described 77 patients submitted to the technique with 4 sutures: medial intercrural suture, bilateral transdomal suture and another interdomal suture along the cephalic board of the LLC using PDS 5.0®. They have verified that these sutures interfere over 7 variables on the nasal tip: projection, supratip, rotation, form, definition, symmetry and bifid columela. However only open technique was used and follow-up was short, 3 to 8 months.

They also suggest that lateral intercrural sutures must be performed at a distance of at least 5 to 6 mm away from the alar edge in order to avoid pinching, unaesthetic scar, preserving the aesthetic triangle described by Sheen (1997)⁹ as well as the natural aspect of the soft triangle.

According to Patrocínio et al. (2009)²¹ on studies in which they have systematized techniques for define nasal tip, authors prefer to perform an interdomal suture on bulbous nose, boxy nose, slightly asymmetric, with increased domal divergence angle or wider domal arch, of patients with thin or medium skin.

Our study has similar indications, but on cases where these deformities are more severe, other techniques can be associated, such as intercrural columelar strut and alar board grafts. However patients that required complementary techniques were excluded from the present study.

Cephalic resection was performed in all cases living a minimum 5mm distance from the medial portion of the LLC and 7 mm on its lateral portion. Patients with interdomal distance with a slight bulbosity were excluded from the study because there would be no indication for narrowing or augmentation and definition of the nasal tip.

Subtle asymmetries on the lower lateral cartilages are common and the LIS can be indicated for cases on which higher LLC can be only at one side, unilateral widening of the domal arch and/or when the cephalic portion of the LLC have different width.

LIS technique does not intent to substitute other techniques of nasal tip refinement that are already consecrated, such as the New Domes Technique described by Pedroza (2002)²⁸ where a lateralization of the domes is proposed in order to obtain an enlargement of the medial crus length, were transdomal and interdomal suture are performed using Vycril® 5.0. In these cases the tip usually requires more structuring, especially on negroids and mestizo noses.

LIS does not substitutes advanced techniques for nasal tip requiring extended shield graft (Rohrich et al., 2002)³⁷, alar support graft (Gunter; Friedman, 1997)³² and alar contour graft (Rohrich et al., 2002)³⁷ necessary

to correct the excessively convex lateral crura or vertically oriented (Rohrich et al., 2002).³⁷

An advantage that must be taken into account is that this technique can be reversed if the interdomal distance gets exaggerated or if there is a reaction to the thread.

The study has verified that the profile of the patients submitted to primary rhinoplasty aiming at a better definition of the tip, indicated a prevalence of young woman. Twenty four patients (44%) had ages between 21 and 30 years. Fifty patients (94%) were females.

There was a prevalence of rhinoplasty with LIS on patients with medium skin thickness (50%), indicating an ethnic miscegenation in our field. Nine percent of the patients had thin skin.

Comparing to the literature patients with thin and medium skin are more indicated for technique of LLC repositioning using sutures (Gruber; Weintraub; Pomerantz, 2008)³⁰. We do not believe that this procedure must not be recommended for patients with thick skin, however a more critical analysis must be made because intercrural columellar struts, graft on the alar edge, nasal caudal septum extensor, and in some cases a graft are required. According to our statistics 41% of the patients were classified as presenting thick skin type.

There was only one case of infection on the nasal tip, a 15 years old patient on the third post-operative month. Conservative treatment with antibiotics was effective with improvement of inflammatory signs and no aesthetic or functional repercussion over the final result.

It was noticed that on 67% of the LIS cases the suture was performed at 3mm lateral to the dome, 26% at 4 mm from the domes and 7% at 2 mm. Thus it is possible to affirm that the sutures are efficient when placed between 2 and 4 mm from the dome.

It must be observed that when more projection of the nasal tip was necessary, meaning an enlargement of the medial crus of the LLC, the suture must be more fixed more laterally. In this circumstance we must be critical about the knot grip in order to not reduce excessively the interdomal distance, avoiding valvular insufficiency and preserving respiratory function.

About the gradual grip of the LIS, we must also evaluate at the transoperative the possibility of a slight increase if the supratip. There is a relation between this defect and the skin thickness, since the knot is hidden on this interdomal space and can discretely elevate the skin (NEDEV, 2009²⁵; GRUBER, 2008³⁰). That would lead to an undesired effect, a subtle "polly beak", the augment of the medium nasal third.

Graphic 3 describes the pre-operative interdomal distance in mm. Distances between 10 and 13 mm corresponded to 83% of the cases, being 31% of 13 mm, 19% of 12 mm and 15% of 10mm. Major

interdomal distance was of 16mm on two patients (4%) and the smaller was of 10 mm on 7 patients (15%). Our aesthetic and functional analyses indicated that the interdomal distance at the transoperative can vary between 6 and 10 mm depending on skin type and the necessity to reduce interdomal distance in comparison to the aesthetic line of the dorsum.

The majority of the interdomal distance was between 8 mm (61% of the cases). Twenty percent presented a 9 mm distance. The wider interdomal distance was 10 mm (4% of the patients) and the smaller one was of 6mm on 8% of the patients (Graphic 3). Therefore the comparison of measures between pre-operative (12.3 mm) and the average of transoperative average interdomal distance (8.1 mm)

indicates a significant diminishing of 4.2 mm proving the efficacy of this technique. Analyzing these distances at the third month of the post-operative period, they stay between 7 and 11 mm, an average of 8.8mm, so there is an increase of 0.8 mm in comparison to transoperative period.

At the sixth post-operative month, when a more objective result is observed, the measure of interdomal distance has stabilized on the same 7 to 11 mm with a small increase of the average to 9.1mm. We believe on the maintenance of the interdomal distance at the sixth month because the average was similar to the previous one. The most important comparison on the evaluation of real efficacy of LIS on reducing interdomal distance would be the transition from the transoperative to the sixth month of post-operative period. Was concluded that the average of 8.1 mm (transoperative) reaches 9.1 mm (post-operative 6th month). Therefore an average increase of 1.0 mm between these distances is acceptable. By means of statistical analysis using Mann & Whitney test comparative values between distances had high significance level $p < = 0,05$. There At this point we suggest a slight hypercorrection on the LIS, around 1.0mm, expecting that as mentioned before, the interdomal distance will increase progressively.

Comparison of different skin types, regarding its thickness, the interdomal distance on thin skin patients was of 7.8 mm (transoperative) reaching 8.8mm at the 6th month (post-operative). Thus, a similar result to the general average increase of 1.0 mm. Medium thickness skin patients presented a 8.1 mm distance (transoperative) followed by a 9.4 mm distance at the 6th month (post-operative), indicating an augment of 1.3 mm, 0.3 mm more than the average. For thick skin patients when comparing the transoperative distance (8 mm) to post-operative measures (8.8 mm) this augment is of 0.2mm, smaller than the average. (Table 3)

VII. CONCLUSION

The result analysis indicates that the reduction of interdomal distance by lateral intercrural suture (LIS)



technique using polydioxane thread (PDS®), diminishes the domal divergence angle, approximates the domes resulting on a better definition of the nasal tip on primary rhinoplasty, maintaining an efficient support with good reliability, low morbidity and low complication index. Therefore this can be a complementary technique to the aesthetic harmonization of the nasal dorsum line

It was also concluded that there was no significant difference among the obtained results regarding gender and skin types. However it would be prudent to hypercorrect that distance in approximately 1.0mm considering the aesthetic and functional relation on noses with slight or moderate deformities

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The Frequency of Incidental Thyroid Carcinoma in Patients with Graves' Disease

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Abstract- Background: The presence of hypoactive nodules in patients with Graves' disease (GD) is an important factor in deciding on surgical treatment. Literatures are inconclusive about the increase in the risk of malignancy in cases of hypoactive nodules accompanying GD. The incidence of incidental malignancy in patients that underwent surgical treatment for GD were evaluated.

Materials and Methods: This study included 108 patients that underwent thyroidectomy due to GD. Hypoactive nodules and diffuse hyperplasia were observed in 59 (54.6%) and 49 (45.4%) of the patients, respectively, during preoperative evaluation. In all 108 patients total thyroidectomy (TT) was the preferred surgical method.

Results: Malignant histopathology was noted in 11 (10.2%) of the 108 patients. The thyroid nodules preoperatively observed in 59 patients were determined to be benign according to fine needle aspiration biopsy (FNAB), which also showed that 7 (11.9%) patients had incidental malignancy.

Keywords: *grave's disease, thyroid nodule, incidental thyroid cancer, surgical treatment.*

GJMR-I Classification: *NLMC Code: QZ 365, WP 460*



Strictly as per the compliance and regulations of:



The Frequency of Incidental Thyroid Carcinoma in Patients with Graves' Disease

The Incidence and Characteristics of Incidental Malignancy in Patients that Underwent Surgical Treatment of Graves' Disease

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Abstract- Background: The presence of hypoactive nodules in patients with Graves' disease (GD) is an important factor in deciding on surgical treatment. Literatures are inconclusive about the increase in the risk of malignancy in cases of hypoactive nodules accompanying GD. The incidence of incidental malignancy in patients that underwent surgical treatment for GD were evaluated.

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Results: Malignant histopathology was noted in 11 (10.2%) of the 108 patients. The thyroid nodules preoperatively observed in 59 patients were determined to be benign according to fine needle aspiration biopsy (FNAB), which also showed that 7 (11.9%) patients had incidental malignancy. Among the 49 patients with diffuse thyroid hyperplasia, but no nodule, 4 (8.2%) were incidentally malignant. Follicular and papillary carcinomas were observed in 1 (9.1%) patient and 10 (90.9%) patients, respectively. Tumor size was ≤ 1 cm in 7 (70%) of the patients with papillary carcinoma. Hyperthyroidism and recurrence were not observed in any of the patients with thyroid carcinoma during a mean follow-up of 27.3 months.

Conclusions: The frequency of incidental thyroid cancer in patients with GD is unignorable high as the present study. The absence of nodules does not rule out the possibility of cancer. TT should be the preferred surgical treatment of GD.

Keywords: grave's disease, thyroid nodule, incidental thyroid cancer, surgical treatment.

I. INTRODUCTION

Graves disease (GD) was first described by Dr. Caleb Hillier Parry and Dr. Robert James Graves' in 1825, followed by Dr. Carl A. Von Basedow in 1840 [1]. Antithyroid drugs and radioactive iodine (RAI) are the classical treatment options; near-total or TT are standard when surgery is preferred [2, 3]. After Shapiro

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et al. observed thyroid cancer in 9% of patients with GD, a large number of studies on the relationship between GD and thyroid cancer were conducted [4]. The rate of incidental cancer in patients with GD that underwent thyroidectomy was reported to be 0%-16.6%, and the cancer was clinically more aggressive [5-8]. The variation in the frequency of incidental thyroid cancer and its aggressive clinical course led to questions about the treatment options for patients with GD.

Thyroid nodules are frequently present in patients with GD, occurring in 22%-45% of patients [9-12]. The incidence of malignancy ranges from 0.4% to 9.8% in patients with thyroid nodules; thus, the treatment of nodules in patients with GD remains a controversial issue due to an increased risk of cancer [13-19]. TT prevents recurrence, significantly contributes to the improvement of exophthalmia in GD, and eliminates the malignancy, as observed in the present study (10.2%). These benefits have solidified the role of TT in the treatment of patients with GD [20]. The aim of the present study was to determine the rate of histopathologically observed incidental malignancy in patients that underwent surgical treatment for GD with hypoactive nodule.

The study was reviewed by the appropriate medical ethics committee and was performed in accordance with the medical ethics standards laid down in an appropriate version of the 1964 Declaration of Helsinki. The study was approved by The Institute's Protocol Review Board.

II. MATERIAL AND METHODS

Data obtained from 1627 patients that underwent surgery due to benign pathologies of the thyroid gland at 2 different hospitals between 2003 and 2012 were retrospectively evaluated. This clinic-pathological study included 108 (6.6%) of these patients that had GD and underwent TT. Clinical and laboratory findings and ultrasonography (USG) and scintigraphy data were recorded. None of the 108 patients received RAI therapy or radiotherapy to the neck prior to surgery.

GD was diagnosed based on history, signs of hyperthyroidism, elevated free thyroid hormones (fT3 and fT4), low thyroid-stimulating hormone (TSH) and

anti-TSH receptor antibody (TRAb) levels, and scintigraphic data. Surgical indications were as follows: recurrent disease following antithyroid drug treatment (n = 67 [62%]); signs of compression due to a large goiter (n = 14 [12.9%]); ophthalmopathy (n = 9 [8.3%]); and patient preference (n = 18 [16.7%]). Among the 108 patients, 59 (54.6%) had hypoactive nodules and 49 (45.4%) had diffuse hyperplasia. Fine needle aspiration biopsy (FNAB) results were benign in the patients with dominant nodules. Tumors <10 mm were considered as microcarcinoma.

Statistical analysis: All analyses were performed using the chi-square test and SPSS v.17.0 for Windows. The level of statistical significance was set at P < 0.05. Age, tumor size, and follow-up period are given as mean ± SD (range) values.

III. RESULTS

The mean ± standard deviation (SD) for GD (with or without nodule) and euthyroid patients' ages was found to be 47,1±12,7 years (16–78 years) / 37,5±12,5 years (16-76 years) and the female/male (F:M) ratio was 79/29 and 462/131 (p>0.05) Table-1. Among the 108 patients with GD TT was performed in 67 (62%) cases due to recurrence following antithyroid drug treatment, 14 (12.9%) cases that had signs of compression due to a large goiter, 9 (8.3%) cases with ophthalmopathy, and 18 (16.7%) cases due to patient preference. In 11 of the 108 patients (10.2%) incidental thyroid carcinoma was observed via histopathological examination, 7 of which were among the 59 patients with nodules (11.9%) and 4 of which were among the 49 patients (8.2%) with diffuse hyperplasia, but no nodule.

Table 1 : Age and sex characteristics of Graves' disease and euthyroid patients who had undergone thyroidectomy

Characteristics	Graves disease patients (n:108)	Euthyroid patients (n:593)	P
Age in years (range)	47,14 ± 12.7	37.5 ± 12.5	0.332
Female: Male (F:M) ratio	79/29	462/131	0.573

As shown in Table-2, mean age of the 4 patients with GD was 41.2 ± 6.5years (37-51 years), the F: M ratio was 4:0, and ophthalmopathy was observed in 2 cases. Mean size of incidental thyroid carcinoma based on histopathological examination in the 4 patients with GD was 9.5 ± 4.7 mm (5-15 mm) (2 were ≤10 mm and the other 2 were 11-20 mm). Histopathological diagnosis in all cases was papillary carcinoma (2 were microcarcinomas). One patient had a multifocal tumor and 2 patients were treated with RAI ablation. Recurrence and mortality did not occur during 30 ± 19.2 months (9-55 months) of follow-up.

Among the 7 patients with nodular GD that also had incidental thyroid carcinoma mean age was 35.1 ± 10.3 years (23-54 years), the F:M ratio was 6:1, ophthalmopathy was observed in 3 cases, mean tumor size was 11.5 ± 6.7 mm (5-25 mm) (5 were ≤10 mm, 1 was 11-20 mm, and 1 was ≥21 mm), histopathological

diagnosis was papillary carcinoma in 6 cases (5 had microcarcinoma), and follicular carcinoma was diagnosed in 1 case (the only male patient in the study group). Histopathological characteristics of the tumors were as follows: capsular and vascular invasion (n = 1); capsular invasion only (n = 1); multifocal tumor with capsular and vascular invasion (n = 1); multifocal tumor with capsular invasion (n = 1); multifocal tumor without capsular or vascular invasion (n = 1). In all, 5 patients were treated with RAI ablation therapy. Recurrence and mortality were not observed during 25.7 ± 10.7 months (12-41 months) of follow-up (Table-2). There wasn't a significant difference in tumor size or mean age between the patients with and without nodules (P > 0.05). The clinical and histopathological characteristics of the 11 patients with incidental thyroid carcinoma are shown in Table-3.

Table 2 : Clinical and histopathological characteristics of the patients with incidental malignancy GD and GD with nodules

Characteristics	GD (n = 4)	GD with Nodules (n = 7)	P
Age in years (range)	41.2 ± 6.5 (37-51)	35.1 ± 10.3 (23-54)	1.000
Female: Male (F:M) ratio	4/0	6/1	
Ophthalmopathy (n)	2	3	
Tumor size [mean (range)]	9.5 ± 4.7 (5-15)	11.5 ± 6.7 (5-25)	1.000
<ul style="list-style-type: none"> • ≤10 mm • 11-20 mm • ≥21 mm 	<ul style="list-style-type: none"> 2 2 - 	<ul style="list-style-type: none"> 5 1 1 	
Pathological results			
<ul style="list-style-type: none"> • Rate of incidental malignancy 	8.2% 4 were papillary carcinoma	11.9% 6 were papillary carcinoma	

	(2 microcarcinoma)	(5 microcarcinoma) 1 follicular carcinoma	
• Rate of microcarcinoma	50%	83.3%	
• Multifocal tumor	1	3	
• Capsular invasion	0	4	
• Vascular invasion	0	2	
RAI ablation therapy	2 cases	5 cases	
Follow-up period in months (range)	30 ± 19.2 (9-55)	25.7 ± 10.7 (12-41)	
Recurrence	-	-	
Mortality	-	-	

RAI: Radioactive iodine.

Table 3: Clinical and histopathological characteristics of the patients with GD and thyroid carcinoma

Case	Age (years)	Gender (M, F)	Clinical Diagnosis	Tumor Size (mm)	Pathological Diagnosis	Multifocality	Capsular Invasion	Vascular Invasion	Surgery	Follow-Up Period (months)
1	26.00	F	G + N	9	PC	-	+	+	BTT	23.00
2	37.00	F	G	15	PC	+	-	-	BTT	24.00
3	39.00	F	G	11	PC	-	-	-	BTT	55.00
4	23.00	F	G + N	5	PC	-	+	-	BTT	41.00
5	37.00	F	G + N	6	PC	+	+	+	BTT	26.00
6	33.00	F	G + N	25	PC	-	-	-	BTT	27.00
7	51.00	F	G	5	PC	-	-	-	BTT	32.00
8	38.00	F	G	6	PC	-	-	-	BTT	9.00
9	41.00	M	G + N	20	FC	-	-	-	BTT	12.00
10	54.00	F	G + N	5	PC	+	+	-	BTT	14.00
11	32.00	F	G + N	5	PC	+	-	-	BTT	37.00

F: Female; M: male; G: GD; N: nodule; PC: papillary carcinoma; FC: follicular carcinoma; -: negative result; +: positive result; BTT: bilateral total thyroidectomy.

IV. DISCUSSION

Thyroid nodules are very common in the general population. The incidence of palpable nodules in regions in which iodine deficiency is endemic is 15% and as high as 50% when thyroid USG is used [13, 21]. The incidence of thyroid nodules in autopsy series varies between 40% and 50% [22]. In the present study 59 (54,6%) of 108 patients that underwent surgery due to GD had solid nodules, which is higher than previously reported and might have been due to the fact that in addition to physical examination imaging techniques were used to detect nodules [5, 7, 9, 10].

The incidence of thyroid carcinoma in patients with GD was 10.2% in the present study, versus previously reported rates as high as 16.6% [5-7]. As the number of histological sections applied to a specimen increases so does the probability of a finding of incidental malignancy in patients with GD with or without nodules.

Papillary thyroid carcinoma is the most common pathological subtype of thyroid cancer, with an incidence of 85% [23, 24]. According to World Health Organization (WHO) classification of thyroid cancers, papillary carcinomas ≤10 mm are defined as papillary

microcarcinoma [24]. In the present study 7 (70%) of 10 patients with incidental papillary thyroid carcinoma had microcarcinoma, which is lower than previously reported rates (75%-100%) of papillary microcarcinoma in GD and in the long-term follow-up of these patients mortality was not observed and the recurrence rates were 3.4%-7.7% in 2 studies, whereas in the present study recurrence and mortality did not occur during follow-up of 11 patients [25- 27].

The optimal treatment of patients with nodular GD remains controversial. According to the recent studies, the risk of malignancy is higher in patients with nodular GD and, as such, thyroidectomy is recommended in the early phase of the disease which also facilitates early diagnosis of incidental thyroid carcinoma in endemic regions [28]. In the present study the rate of incidental thyroid malignancy rate was higher in the patients with nodules than in those without nodules (11.9% and 8.2%, respectively). In addition, absence of nodules in GD does not eliminate the risk of malignancy.

Incidentally detected thyroid malignancies in patients with GD are often microcarcinomas; in the present study the papillary microcarcinoma rate was

70%. Most cases of thyroid malignancies in patients with GD were characterized by an insidious clinical course and were detected incidentally; some patients had poor prognosis, developed distant metastases, and died due to disease [29, 30]. The advantages of TT in GD are treatment of hyperthyroidism, prevention of relapse, treatment of compression-induced symptoms, contribution to pregnancy planning, and especially treatment of exophthalmia. In the present study TT was found to be advantageous for preventing malignancy at a considerable rate of 10.2% and facilitating early diagnosis as well. These advantages have solidified the role of bilateral TT in the treatment of GD.

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Cancellation of Elective General Surgical Operations at the Day of Intended Surgery

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Objectives: To determine the magnitude and point prevalence of surgery cancellation in patients scheduled for elective operation and it`s different reasons.

Patients and methods: A prospective cross sectional study carried out in Omdurman teaching hospital for all patients scheduled for elective general surgical operations in one year (2012 August - 2013 August).

Keywords: Cancellation; elective operation; postponement.

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CANCELLATION OF ELECTIVE GENERAL SURGICAL OPERATIONS AT THE DAY OF INTENDED SURGERY

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Cancellation of Elective General Surgical Operations at the Day of Intended Surgery

Ahmed A Elrahman ^α, Aamir A Hamza ^σ & Mohayad A El-Haj ^ρ

Abstract- Background: Cancellation of surgical operations in hospitals is a significant problem with many undesirable consequences. Cancelled operations can annoy patients and their families. They are a major drain on health resources, increases theatre costs, results in wasted operating room time and decreases efficiency. In spite of the extensive available literature on preparation of surgical patients and performance of surgical procedures, the focus given to the cancellation of planned surgical operations has been quiet restricted globally.

Objectives: To determine the magnitude and point prevalence of surgery cancellation in patients scheduled for elective operation and its different reasons. **Patients and methods:** A prospective cross sectional study carried out in Omdurman teaching hospital for all patients scheduled for elective general surgical operations in one year (2012 August - 2013 August).

Results: During the study 2750 patients were scheduled for general surgical operations, 2460 (89.5%) patients were operated on their planned date. A total of 290 (10.6%) operations were cancelled. Mean age was 41.2 ± 16.5 years with female to male ratio 1.2:1. There were many reasons for postponement of surgery; the main reasons were categorized into medical related, patient related, administrative, inadequate preparations of patients and other reasons accounted for 30%, 25.5%, 21%, 19.7% and 3.8% respectively. The major three causes for cancellation in the study were; failure of the patients to attend uncontrolled high blood pressure and overloaded schedule, these were seen in 57 (19.7%), 35 (12.1%) and 32 (11.0%) respectively. Most of the reasons 76.9% were potentially avoidable.

Conclusion: It was obvious that most of the reasons of postponement of elective general surgical operations were avoidable and can be prevented by simple steps. Cancellations can be minimized if the patients with medical problems were detected early and referred for an anaesthetic assessment soon after they are scheduled for surgery.

Keywords: cancellation; elective operation; postponement.

I. INTRODUCTION

Most of the surgeries in Omdurman Teaching Hospital are being performed at a low cost. This means a huge number of patients most of whom belong to lower socio-economic class and travelling from far areas, arriving to be operated.

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Elective surgery is an important part of a hospital's workload. Unanticipated postponement on the day of surgery is a tremendous emotional as well as economical trauma for such patients in addition to causing an increase in operation theatre costs and decrease in its efficiency⁽¹⁾.

Cancellation of surgical operations in hospitals is a significant problem with many undesirable consequences. Cancelled operations can annoy patients and their families. They are a major drain on health resources, increases theatre costs, results in wasted operating room time and decreases efficiency. However, the performance of a surgical operation on schedule requires a complex process of logistics. In spite of the extensive available literature on preparation of surgical patients and performance of surgical procedures, the focus given to the cancellation of planned surgical operations has been quiet restricted globally⁽²⁾. Elective surgery is an important part of a hospital's workload. Whenever a case is put on list, it involves interaction of a number of people and in the same way its postponement affects many parties⁽³⁾. Different definitions of cancellation exist in the international literature⁽⁴⁾. Some authors define 'cancellation' as only those procedures that were cancelled on the day on which surgery was scheduled, whereas others also include those that were cancelled on the previous day^(5, 6).

II. PATIENTS AND METHODS

This is a prospective, cross sectional, descriptive, hospital-based study that was conducted at Omdurman Teaching Hospital over one year (2012 Aug to 2013 Aug). All patients scheduled for different elective general surgical procedures during the time of study were enrolled. Non-probability sampling, with total coverage during the study period was adopted. Included were patients scheduled for elective general surgery after accepting the given informed consent. All patients scheduled for emergency surgery or subspecialty surgical procedures were excluded. Pre-designed questionnaire was used for data collection. Variables included patient's characteristics, type of operation, medical related reasons, inadequate preparation of patient, administrative related reasons, patients related reasons and others. The collected data was processed, and analyzed statistically using SPSS computer package version 20.0. Percentages were calculated & Chi-square test was used to analyze the

difference between the various groups. Statistical significance was accepted for $P < 0.05$. Preoperative consent was obtained from patients together with hospitals approval ethical clearance.

III. RESULTS

a) Patients' demographics

A total number of 2750 patients were scheduled for general surgical operations; most of them 2460

(89.5%) were operated upon on planned date. A considerable number 290(10.6%) of operations were cancelled. Four operation lists were lost completely due to vacation.

Females were predominant 161(55.5%), with female: male ratio of 1.2:1. The mean age was 41.2 ± 16 years and (range 2 - 80 years). Most of the patients 180 (62.0%) were in the age group 21-50 years (Table 1).

Table 1 : The age group of cancelled elective general surgical operations at Omdurman teaching hospital

Age (years)	Frequency	Percent
2-10	7	2.4
11-20	26	9.0
21-30	60	20.7
31-40	59	20.3
41-50	61	21.0
51-60	36	12.4
61-70	34	11.7
71-80	7	2.4
Total	290	100

b) Categories of cancellation

There were many reasons for postponement of surgery and were categorized into medical related, patient related, administrative, inadequate preparations

of patients and other reasons. Medical and patients related reasons were the commonest and accounted for 30%, 25.5% respectively (Figure 1).

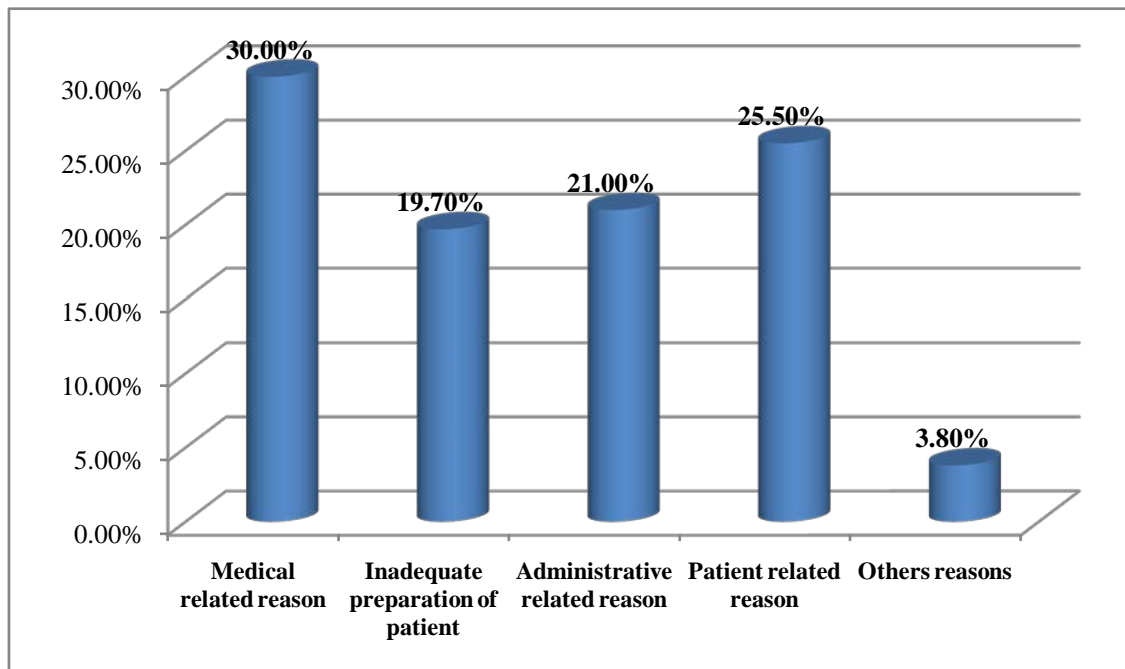


Figure 1 : Type of reasons for cancellation of elective general surgical operations at intended date at Omdurman teaching hospital

c) Medical related reasons for cancellation

The most common medical related reasons for cancellation were; high blood pressure (39.8%), change of treatment plan (22.7%) and haemoglobin less than ten gram/dl (12.3%) of cancellations within this category. Other causes with lesser percentage included; uncontrolled Diabetes Mellitus, upper respiratory tract infection, ischemic heart disease (Table 2).

d) Patient related reasons

Failure of patients to attend is commonest patient related reason accounted for 19.7% of all cancellation. However patient refusing surgery or financial problems constituted 20.3% within this group of reasons (Table 2).

Table 2 : Different categories and reasons for cancellation of elective general surgery operations in the study

Medical reasons	Frequency	Percent	
		Within Total	Within Category
High Blood pressure	35	12.1%	39.8%
Diabetes mellitus	07	2.4%	07.9%
Upper Respiratory tract infection	03	1.0%	03.4%
Anaemia	11	3.8%	12.5%
Ischemic heart disease	03	1.0%	03.4%
Unfit for medical condition	04	1.4%	04.5%
Change of treatment plan	20	6.9%	22.7%
Abnormal laboratory results	04	1.4%	04.5%
Patient taking aspirin	01	0.3%	01.1%
Total	88	30.3%	100%
Patient related reasons			
Patient failed to attend	57	19.7%	77.5%
Patient refusal	6	2.1%	08.1%
Financial problems	9	3.1%	12.2%
Total	74	24.9%	100%
Administrative related reasons			
Overload schedule	32	11.0%	54.3%
Lack of Anesthetists	10	3.4%	16.9%
Equipment failure	8	2.8%	13.6%
Power breakdown	1	0.3%	01.7%
No water supply	8	2.8%	13.6%
Total	59	20.3%	100%
Inadequate patient preparation reasons			
Medicine not arranged	1	0.3%	02.1%
Poor gut preparation	5	1.7%	10.6%
Patient not euthyroid	3	1.0%	06.4%
Anesthesia work-up need	1	0.3%	02.1%
Some investigation not done	20	6.9%	42.6%
Blood not available	12	4.1%	25.2%
Blood not arranged	15	5.2%	31.9%
Total	47	17.5%	100%
Other reasons for cancellation			
Failure of administer anesthesia	2	0.7%	15.4%
Referral to other consultant	2	0.7%	15.4%
Operation not required	1	0.3%	7.70%
Failed intubation	1	0.3%	7.70%
Admissions error	3	1.0%	23.0%
Operated elsewhere	1	0.3%	7.70%
Others	1	0.3%	7.70%
Lack of staff of surgeons	3	1.0%	23.0%
Total	13	4.6%	100%

e) *Administrative related reasons*

The most common administrative reason for cancellation was shortage of time to cover the whole list of operations, which accounted for 11% of all cancellations and more than half the reasons within this category. Failure of equipment needed to conduction the specific operation or no water supply accounted for 13.6% each (Table 2).

f) *Inadequate patient preparation reasons*

Blood not arranged or unavailable in 57.1% and some investigations not done 42.5% were the major contributing factors for surgery cancellation in this group. However drugs not arranged, poor gut

preparation for colonic surgery or uncontrolled thyroid patients were the reasons for few elimination (Table 2).

g) *Other reasons for cancellation*

Admission errors or absent consultant surgeons constituted one percent each from the total cancellations (Table 2)

IV. DISCUSSION

Surgical cancellation is scheduled surgery which is not done at intended date. An efficient surgical service should have a low rate of cancellation. If operations are cancelled, the Operation Theatres (OT) are underused, efficiency is jeopardized, waiting list

increases and cost rises ⁽⁷⁾.The National Audit Office in Britain examined five district health authorities in detail and concluded that Operation Theatres were being used half their capacity in spite of huge waiting lists ⁽⁸⁾.Most operations are cancelled at 24-hour notice⁽⁹⁾. The patients and the relatives feel disappointed, frustrated, and anxious ⁽¹⁰⁾.

a) *Cancellation rate*

In this study the cancellation rate(CR) of elective general surgical operations was 10.6 % which is similar

to a previous report from a developing country(11). However, cancellation rates ranging between 19% and 33% were reported from other developing countries(12, 13), compared to rates between 11% and 24% from developed countries(14,15).The cancellation rate found in this study was compared to cancellation rates reported by different authors (Table 3).

Table 3 : Cancellation rate of surgical operations in different studies

Author	Year	Country	Cancellation rate
Hand R, et al. ⁽¹⁴⁾	1990	USA	17.0%
Magbool G, et al. ⁽¹¹⁾	1993	Saudi Arabia	09.1%
Lacqua MJ, Evans JT ⁽²³⁾	1994	USA	17.0%
Cavalcante JB ⁽¹²⁾	2000	S. America	33.0%
Aguirre-Cordova JF ⁽¹⁵⁾	2003	Mexico	24.0%
Fersch MB, et al. ⁽²⁴⁾	2005	USA	13.0%
Schofield WN, et al. ⁽²⁵⁾	2005	Australia	11.9%
Paschoal ML, Gatto MA ⁽¹³⁾	2006	Brazil	19.9%
Sanjay P, et al. ⁽²⁶⁾	2007	UK	14.0%
ZafarA,et al. ⁽²⁷⁾	2007	Pakistan	25.0%
Doumi EA, et al. ⁽¹⁾	2008	Sudan	09.9%
current study *	2013	Sudan	10.6%

In the present study, the most common types of cancelled operations were thyroid, breast, hernias and anorectal conditions.For a multi-dimensional problem such as surgical cancellations, it is important to address major reasons that result in cancellations.

b) *Medical related reasons*

Among medical related reasons (MRR) uncontrolled high blood pressure (HBP) is commonest reason accounted for 35 (12.1%) cancellation. Hypertension is certainly associated with an increased risk of peri-operative morbidity and mortality and a diastolic blood pressure of 110-115 mmHg was considered as a cutoff for postponing anaesthesia ⁽¹⁶⁾.Doumi EA, et al. in El Obied Teaching Hospital in Western Sudan also found that HBP is commonest MRR accounted for 22.2% ⁽¹⁾, as well as reported in similar study in London ⁽¹⁷⁾.

Majority of elective patients were seen by the anaesthetist only on the day prior to surgery. So the preoperative optimization is done over a short period of time. Studies have shown that preoperative anaesthesia assessment of patients in anaesthetic assessment clinics significantly reduces operative room delays and cancellations ⁽¹⁸⁾.

The uncertainty of the highest safe blood pressure for anaesthesia results in variations in practice ⁽¹⁹⁾.

The second reason in MRR is change treatment plan due to recent change in clinical status which account for 6.9 % in our study and showed to be 7.4% in Doumi EA, et al. study⁽¹⁾.

c) *Patient related reasons*

Failure of patient to attend is the commonest cause in this category and accounted for 57 (19.7 %). This could be attributed to fear of operation due to inadequate psychological preparation.A similar significant number found in study done in Nigeria by A.S Oguntol, et al.(19)(20).

d) *Administrative related reasons*

Considering administrative related reasons (ARR), shortage of time accounted for 32 (11%)of the operation cancelled. This found to be greater than 5.6% in Western Sudan⁽¹⁾ and 1.2% in Nigeria⁽¹⁹⁾ studies and less than that of William, et al. study 18.7%⁽²⁰⁾. Lack of anaesthesia staff, power break down and no water supply were the other ARR.When analyzed these reasons were due to failure of the hospital administration to recognize the needs of the operative theatre and the indifferent attitudes among the theatre staff.

A lot of precious time was lost in-patient transport in or out of the operative theaters (OT), in induction of anesthesia, in surgical preparation and draping. The room turn over time may be also reduced if more recovery room beds were made available ⁽²¹⁾. In a recent study it was found that only 7%the surgical procedures were started on time ⁽²²⁾.

Training and delegation of responsibilities to young motivated qualified nurses as 'Sister-in-charge' to take over the administrative responsibility of the operating theater might help to overcome the problem.

e) *Inadequate patient preparation*

The most common inadequate patient preparation reasons (IPPR) was some investigations not done which accounted for 6.9% of all cancellations. This reflects the reluctance of surgical staff and lack of collaboration with anaesthetic staff. Although this is low compared with 7.1%-27.2% in other different studies^(1, 19). Incomplete investigations also could be secondary to lack of funds to pay for the tests rather than inefficiency of the laboratories, though occasionally lack of reagents, poor electricity supply are common causes in the developing countries.

Blood not arranged is a second common reason in IPPR, accounted for 5.2% which is greater than 0.4%⁽¹⁾ and less than 11.2%⁽¹⁹⁾.

Phobia for blood donation by patient relatives and the public at large, prevent adequate stocking of our blood banks, thus blood not easily made available for surgical procedures. There is a need to reawaken the usual mass donation by groups of students, civil servants, societies and associations. Auditing of blood usage during surgical procedures should be carried out in various centers in order to really determine what should be the minimum number of units to be requested for procedures.

Lack of surgeons and admission errors, accounted for one percent each, this was another reason for cancellations. It is rather higher than 0.6% for absence of surgeon and 1.2% for admission error in other study⁽¹⁾. This occurred in units where team leaders were either part time employees, involved in hospital administration or reporting late due to long distance travels. Adequate staffing of surgical teams and theater workers including porters shall reduce the time wastage thus enhancing efficiency.

Unplanned admissions and lengthy OT lists prepared by junior surgeons, who were not familiar with the procedures, was also a reason for operation cancellation. Many patients did not need surgery or required further work up before surgery. Ensuring that only consultants book patients for surgery would reduce the number of cancellations due to incorrect indication of surgery with significant impact on operating time available. Influence of surgeon experience was observed in this study and found inexperienced surgeons add significantly to the operation time. Consultants were quicker and their presence reduced the likelihood of complications, thus reduced operative time. Moreover it was observed that if a consultant surgeon and consultant anaesthetist were present in OT, the list is likely to proceed with fewer delays⁽¹⁹⁾. In our study most of surgeries were cancelled at the intended date 53.8% which reflect the importance of preoperative rounds.

f) *Avoidable causes of cancellation*

Schofield, et al. 2005 classified the causes of cancellation of operations as avoidable and non-

avoidable⁽¹¹⁾. In our study non avoidable causes were recent clinical changes in the patient's condition, patient who didn't show up, inability to pay fees, cancellation by the patient and cancellation due to emergency priority accounted for 23.1%. Accordingly the majority of our cancellations 76.9% were potentially avoidable.

At another study performed at ambulatory surgery practice in the United Kingdom, reasons for cancellation were: acute medical conditions in 23.3% of cases, personal decision of the patient to refuse programming in 22.2%, non-attendance in 2.1%, failure to follow pre-operative guidance in 23.3% and unavailability of resources in 29%. These causes were preventable or possibly preventable in 57.1% of cases, difficult to prevent in 29% and not preventable in 13.9%⁽⁶⁾.

V. CONCLUSION

It was obvious that most of the reasons of postponement general surgical operation were avoidable and can be prevented by simple steps. Cancellations can be minimized if the patients with medical problems were detected early and referred for an anaesthetic assessment soon after they are scheduled for surgery.

In order to enhance cost – effectiveness and efficiency; efforts should be made to prevent unnecessary postponement through careful planning aimed at increasing operation theatre spaces and efficient utilization of few available hospital resources including that of the operating room, theatre facilities and valuable man power improving the scheduling and admission procedure is required for better use of hospital resources.

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Pattern and Clinical Profiles of Paediatric Abdominal Tumors at Khartoum and Ribat University Hospital

By Omer E. M. Khair, Mr. Amir Abdalla Mohammadin & Dr. Hassan. I. A.

Abstract- Background

Objectives: The aim of this study was to determine the mode of presentations, clinical profile and the sensitivity of imaging in the abdominal tumours in paediatric and types of tumours.

Methods: This was a prospective and retrospective cross sectional study conducted in Khartoum Teaching Hospital and Ribat University Hospital in the period between April 2012 to April 2014. Variables studied included clinical presentations, imaging used for work up, types of abdominal tumours with regional distributions, and duration of symptoms.

Results: fifty-eight patients enrolled, males, 55.2 % (n=32), and females, 44.8 % (n=26), ages group range between (28 days-13 years) with mean 4.6 years. 51.7% from the center of Sudan, 27.6% from West, 15.5% from Gezira, and 5.2% from North. Most of them presented with abdominal mass and pain 89.7 % (n=52), fever 74.1% (n=43), anemia 77.6 % (n=45), four (6.9%) of them presented as acute abdomen (intussusceptions), two presented with mass and jaundice. Six presented with urine retention (10.3%).

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Pattern and Clinical Profiles of Paediatric Abdominal Tumors at Khartoum and Ribat University Hospital

Omer E. M. Khair ^α, Mr. Amir Abdalla Mohammadin ^σ & Dr. Hassan. I. A. ^ρ

I. INTRODUCTION

A palpable mass in the abdomen of a child is a serious finding. In a small child, the daily bath is always given by the mother, it is thus common for the mother to notice a mass in the abdomen while scrubbing or drying the child. The child may have no symptoms and is unaware of the mass. The mass may be the only sign of something not normal.

Abstract- Background

Objectives: The aim of this study was to determine the mode of presentations, clinical profile and the sensitivity of imaging in the abdominal tumours in paediatric and types of tumours.

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Histologically: 91.1% malignant tumours, the rest were benign and two cases; (abdominal TB). WT 31%(n=18), lymphoma 27.6%(n=16), neuroblastoma 12.1%(n=7), HB & teratoma 6.9%(n=4) for each, neuroectodermal 3.4%(n=2), adinocarcinoma, fibro sarcoma, rhabdomy-osarcoma and peutz-jegher 1.7%(n=1) for each. Two cases 3.4% were abdominal TB. About nineteen patients (32.8%) died shortly after starting workup (late presentation).

Conclusion: Abdominal mass in paediatric is serious conditions. Good evaluation, awareness with symptoms and signs with reliable imaging and histological investigations; are a corner stone for the early diagnosis and improvement of outcome.

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II. RESULTS

Fifty-eight patients were enrolled in this study. Of the total number, 32 were male (55.2%) and 26 female (44.8%), (Figure: 1). their ages range between (28 days to 13 years), mean ages were 4.6 years (std ± 3.4).

Regarding geographical distributions, thirty (51.7%) patients from the central part of the Sudan, sixteen (27.6%) from the West, nine (15.5%) from Gezira, three cases (5.2%) from the Northern part of Sudan, and no cases in this study group from the East.

The common presenting symptoms that include the following: Twenty patients (34.5%) presented with abdominal mass, thirty-two (55.2%) presented with abdominal mass and pain together, (so 89.7% presented with abdominal mass). four of patients (6.9%) presented as acute abdomen (an intussusceptions), two (3.4%) patient came with abdominal mass and jaundice, one (1.7%), (Table: 1). Other symptoms that associated with mass were urinary symptoms, in which six patients (10.3%) had episodes of urine retention. There are some constitutional symptoms such as fever, which found in forty-three (74.1%) of patients (Table: 1), another symptoms like constipations, fatigability and loss of appetite also found. The duration of symptoms range between 15 days to 3 months, mean 1.7 months, and (std ± 0.73).

During clinical assessment, fifty-two (89.7%) had obvious abdominal masses. two with jaundice, Regarding blood investigation, forty-five of them (77.6%) were presented with anemia (Table:1) and received blood transfusions.

Concerning imaging investigation, forty-six (79.3%) of them under went abdominal ultra sound scanning (US), with sensitivity (67.4%), sensitive in (31) patients. And CT scan was done for Forty-seven (81%), with sensitivity (80.6%), sensitive in (38) patients, and only two patients (3.4%) had MRI, which sensitive in both cases.

Histological diagnosis was done for all patients, these include (incision, tru-cut, and excisional biopsy).

The final results of histological diagnoses were as following: malignancies (91.1%), the rest were benign and two cases; abdominal TB.

Concerning the types of tumours; eighteen patients (31%) were Wilm's tumor(Wt), sixteen (27.6%) lymphoma, seven(12.1%) neuroblastoma (NB), four(6.9%) hepatoblastoma(HB), four(6.9%) teratoma, two cases(3.4%) neuro-ectodermal tumors, others rare cases were adinocarcinoma of the small bowel, fibrosarcoma, Rhabdomyosarcoma, and peutz-jegher syndrome, one case for each(1.7%). Two cases (3.4%)

were diagnosed finally as abdominal tuberculosis (TB) (table 2).

Thirty-nine of them (67.2%) underwent surgery, and nineteen (32.8%) not. These were died during the workup and some just started neoadjuvant treatment (late presentation).

Table 1 : common symptoms and signs

symptom	No (%)	fever		anemia		Urine retention	
		yes	no	yes	no	yes	no
Abdominal mass	20 (34.5%)	11	9	11	9	4	16
Mass & pain	32 (55.2%)	27	5	32	0	2	30
Acute abdomen	4 (6.9%)	4	0	0	4	0	4
Mass& jaundice	2 (3.4%)	1	1	2	0	0	2
total	58 (100%)	43	15	45	13	6	52

Table 5 : tumour distribution between genders and age groups

Tumour	Number		Age(years)		Total
	male	female	<5	> 5	
Wilm's tumour	8	10	13	5	18
Lymphoma	11	5	7	9	16
Hepatoblastoma	2	2	4	0	4
Neuroblastoma	6	1	5	2	7
Teratoma	1	3	3	1	4
Adenocarcinoma	1	0.0	0	1	1
Ptz	1	0.0	0	1	1
Ganglioneuroma	0.0	1	1	0	1
Neuroectodermal	0.0	2	2	0	2
Fibrosarcoma	0.0	1	0	1	1
Rabdomyosarcoma	1	0.0	1	0	1
Abdominal TB	1	1	0	2	2
Total	32	26	36	22	58
Percentage	55.2%	44.8%	62.1%	37.9%	100%

III. DISCUSSION

In this study fifty-eight (58) patients were included. The ages groups of the patients in the study range from (28days to 13 years), mean ages was (4.6 years), these means that the youngest patient was less the one month old and the oldest patient was 13 year, and in general the majority of ages were between 2-3 years.

most common symptoms and signs:

- Abdominal mass, twenty patients (34.5%)
- Abdominal mass & pain, thirty-two (55.2%).

This means that about (89.7%) of patients presented with abdominal mass.

- Acute abdomen (intussusceptions) in four patients 6.9%.
- Abdominal pain and jaundice (3.4%).
- Other symptoms; burning micturation and urine retention in six patients (10.3%). There are some

constitutional symptoms such as fever which found in forty-three (74.1%) of patients (table: 1), constipations, and loss of appetite. These symptoms indicate the effect of complication, as some of patients presented late and this is similar to the study that said The care of children with malignant solid tumors in sub-Saharan Africa is compromised by resource deficiencies that range from inadequate healthcare budgets and a paucity of appropriately trained personnel ,and this similar to literature review that in general presentation varies depending on the underlying pathology of the abdominal mass

Regarding the duration of symptoms, this range between the (15 days-3 months) (mean 1.6), and the majority of them (44.8%) presented within 2 months. The reasons for delayed of presentation in our study, were attributed to that; the majority of presenting symptoms were painless abdominal mass (and in addition to lack of the health care among nearly all the mothers), the

next is the, most of the patients come from remote areas and the accessibility is a problem the other reason which picked up is that, some of them had finance problems.

The distribution of patients according to the residence; most of the patients (51.7%) with abdominal mass were from the center (including the capital) but these majority of patients most of them originally from the out of a center and may be related to increased number of migrations toward the center. (27.6%) from the West, (15.5%) from Gezira, (5.2%) from the Northern part of Sudan, and no case reported from the East.

All patients underwent clinical evaluation (history, examination, and investigations), from the history the majority of them present with abdominal mass and pain (see above), others with only abdominal mass that discovered by their mothers and this corresponding to the general rule, which says that most of the abdominal mass in children (mainly WT) are detected by mothers during bathing their babies.

On examination, most of them looks unwell, cachexic, and these are the main features of late presentation, and about fifty-two (89.7%) had abdominal masses. Forty-three (74.1%) had fever. Regarding blood investigations, about (77.6%) had anaemia (n=45) all of them received blood, again this is the sign of late presentation. Regarding imaging investigations, US done for forty-six patients and the sensitivity was (67.3%), in the comparison with the study done in period between 1990-1998 in Sudan for abdominal masses in infants and children, the sensitivity of US was (92.3%). CT scan done for forty-seven and the sensitivity was (80.3%). in addition to that most of patients from poor families, and this observed in our study, some patients left the hospital before complete the workup.

Biopsy was performed for the patients and the final (histological) diagnosis were the following; fifty-one (91.1%) malignant, and seven benign these including two cases of TB.

Nephroblastoma was the predominant, comprised about eighteen patients (31%), followed by lymphoma sixteen (27.6%), neuroblastoma seven (12.1%), hepatoblastoma four (6.9%), teratoma four (6.9%), two cases (3.4%) neuro-ectodermal tumors, others rare cases were adino-carcinoma of the small bowel, fibro-sarcoma, rbdomyosarcoma, and peutz-jegher syndrome, one case for each (1.7%). Two cases (3.4%) were diagnosed finally as abdominal tuberculosis TB (table 2).

In comparison with previous study in Sudan which done within 8 years duration; the number of tumour now increased with the predominant is WT, previously was lymphoma.

This study is similar to that done by Rai AT and Moazam F. of 53 patients between the ages of 1 and 18 years, with malignant abdominal tumors seen between

1987 and 1993 were reviewed. Wilm's tumor was the most common tumor constituting 28.3% of all cases. The others included Non-Hodgkin's lymphomas (20.8%) and neuroblastomas (11.3%).

IV. RECOMMENDATIONS

Since paediatric abdominal tumours are increasing recently, we recommend the following:

- Improvement of health education for mothers to be aware about early symptoms and signs of abdominal mass.
- Health personnel must be aware to examine the abdomen carefully for any reason in order not to miss abnormalities.
- Early seek of surgical advice is a must.
- Protocol and guideline for abdominal tumours management in children should be adopted, and multidisciplinary team should be established. Including; paediatric surgeons, oncologist, pathologist, radiologist.
- Imaging and histological investigations must be done properly and definitely, including cell type, degree of differentiation, histochemistry and tumour markers are appropriate for better management and outcome.
- Funding for paediatric patients with tumours should be discussed, and at least should be free as most of patients from remote areas and poor.
- Finally, tumour registry should be resumed, for documentation and evaluation to know the outcome and the epidemiology of tumours to define accusative factors, for some of these tumours when there is some preponderance of certain tumour in ascertain geogra-phical arises; e.g. EBV in BL in Uganda.





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A 3 Year Prospective Study of 1400 Cases of Perforation Peritonitis : Asia's Largest Single Centre Study

By Puneet Malik, B L Yadav, Kulbhushan Haldeniya, Gajendra Anuragi
& Ravindra Goyal

Abstract- Aims & Objectives: Intestinal Perforations are most common surgical emergencies seen worldwide. Despite improvement in diagnosis, antibiotics, surgical treatments and intensive care support, it is still an important cause of mortality in surgical patients. This study was done to know the spectrum of etiology, clinical presentation, management and treatment outcomes of patients admitted with perforation peritonitis in our hospital.

Methods: A prospective study was done over a period of 3 years from January 2011 to December 2013 in SMS medical college and hospital, Jaipur, Rajasthan which included 1400 patients diagnosed with perforation peritonitis. All patients admitted with perforation of gastrointestinal tract were included in this study. All cases of primary peritonitis and anastamotic leaks were excluded from this study.

Results: Total of 1400 cases were included with 74.28% being males. The time taken for resuscitation, diagnosis and preparation of patient for surgery was less than 12 hours in 83.4% of cases.

Keywords: intestinal, perforation, peritonitis.

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A 3 Year Prospective Study of 1400 Cases of Perforation Peritonitis : Asia's Largest Single Centre Study

Puneet Malik ^α, B L Yadav ^ο, Kulbhushan Haldeniya ^ρ, Gajendra Anuragi ^ω & Ravindra Goyal [¥]

Abstract- Aims & Objectives: Intestinal Perforations are most common surgical emergencies seen worldwide. Despite improvement in diagnosis, antibiotics, surgical treatments and intensive care support, it is still an important cause of mortality in surgical patients. This study was done to know the spectrum of etiology, clinical presentation, management and treatment outcomes of patients admitted with perforation peritonitis in our hospital.

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Results: Total of 1400 cases were included with 74.28% being males. The time taken for resuscitation, diagnosis and preparation of patient for surgery was less than 12 hours in 83.4% of cases. Most common symptom with which patient presented was abdominal pain(99%) followed by nausea (92%), vomiting(85%), abdominal distension(71%), fever(64%) and altered bowel habit(42%). 12% patients were in shock. Most common site of perforation noted was duodenum(35.8%) followed by ileum(27.6%). Gastroduodenal perforations were mainly caused by Acid peptic disease(93%). Jejunal by blunt trauma abdomen(96%), ileal by typhoid (64%) and tuberculosis(31%) and colonic by malignancy(77%). Primary repair was done in 49.6% cases. 11% cases required resection and anastomosis, 21% required resection without anastomosis and Appendectomy was done in 18.4% cases. Overall mortality was 7.2%.

Conclusion: In contrast to western literature, where lower gastrointestinal tract perforations predominate, upper gastrointestinal tract perforations constitute the majority of cases in India with APD, typhoid and tuberculosis being the commonest causes.

Keywords: *intestinal, perforation, peritonitis.*

I. INTRODUCTION

Intestinal Perforations are most common surgical emergencies seen worldwide. Despite improvement in diagnosis, antibiotics, surgical treatments and intensive care support, it is still an important cause of mortality in surgical patients. This study was done to know the spectrum of etiology, clinical presentation,

management and treatment outcomes of patients admitted with perforation peritonitis in our hospital.

II. MATERIALS AND METHODOLOGY

A prospective study was done over a period of 3 years from January 2011 to December 2013 in SMS medical college and hospital, Jaipur, Rajasthan which included 1400 patients diagnosed with perforation peritonitis.

Inclusion criteria: all patients admitted with perforation of gastrointestinal tract were included in this study.

Exclusion criteria: all cases of primary peritonitis and anastomotic leaks were excluded from this study.

All patients were studied in terms of clinical presentation, etiology and site of perforation, surgical treatment, postoperative complications and mortality. All patients following a clinical diagnosis of perforation peritonitis and adequate resuscitation, underwent exploratory laparotomy in emergency setting. At surgery the source of contamination was sought for and controlled. The peritoneal cavity was irrigated with 5-6 litres of warm normal saline and drain was placed. Abdomen was closed with continuous, number one PDS suture material. Although all patients received appropriate perioperative broad spectrum antibiotics, the drug regimen was not uniform.

III. RESULTS

Total of 1400 cases were included in this study. 74.28% being males(1040), with male: female ratio of 2.8. Mean age of presentation was 32 years with minimum age being 17 years and Maximum being 72 years. (figure 1)

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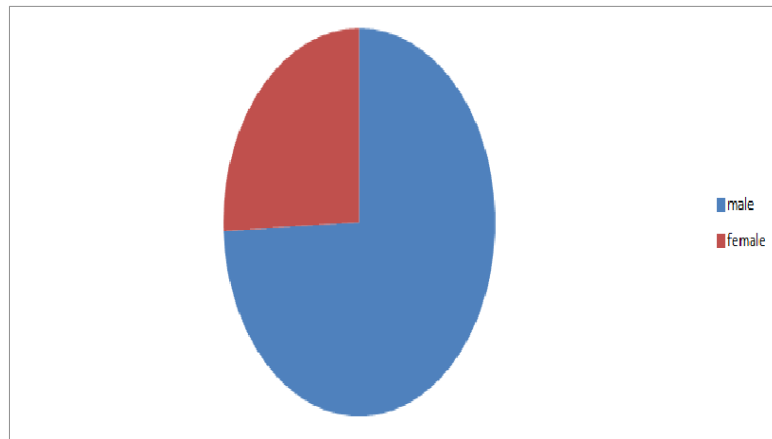


Figure 1 : Sex ratio – male : female was 2.8:1

The time taken by the patient between onset of symptoms and presentation to the hospital was less than 24 hours in 532 cases(38%) and more than 24 hours in 868 cases(62%).(figure 2)

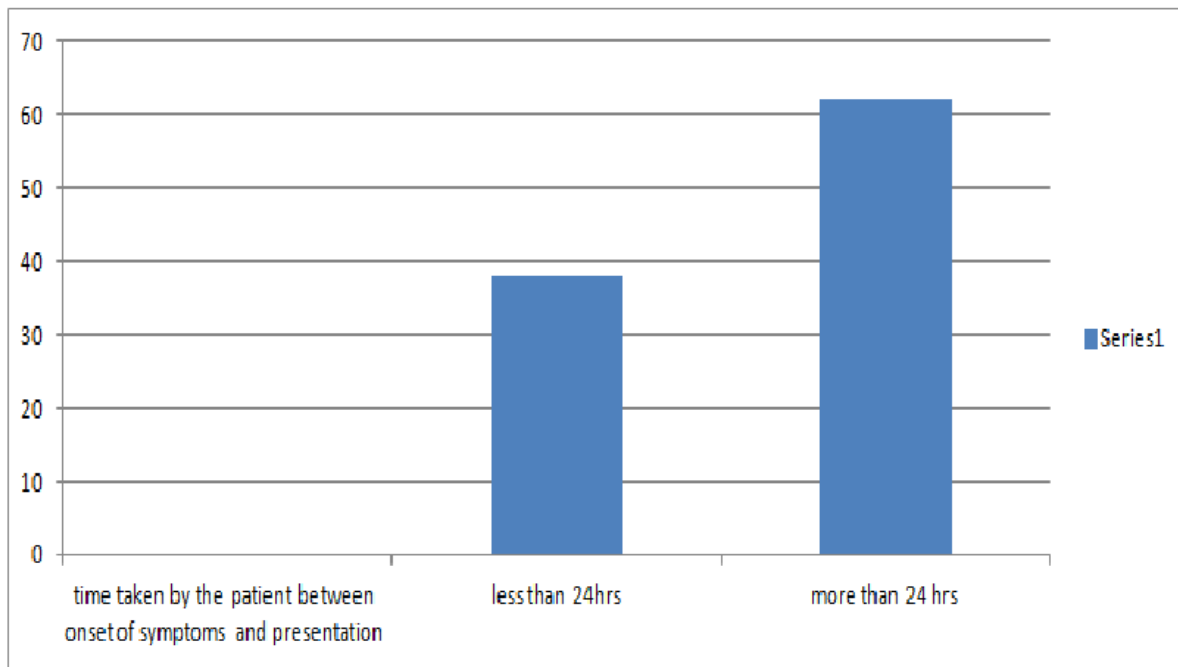


Figure 2 : Time taken by the patient between onset of symptoms and presentation was less than 24 hours in 38% cases and more than 24 hrs in 62% cases

The time taken for resuscitation, diagnosis and preparation of patient for surgery was less than 12 hours in 83.4% (1168)of cases and more than 12 hours in 16.6% (332) patients.(figure 3)

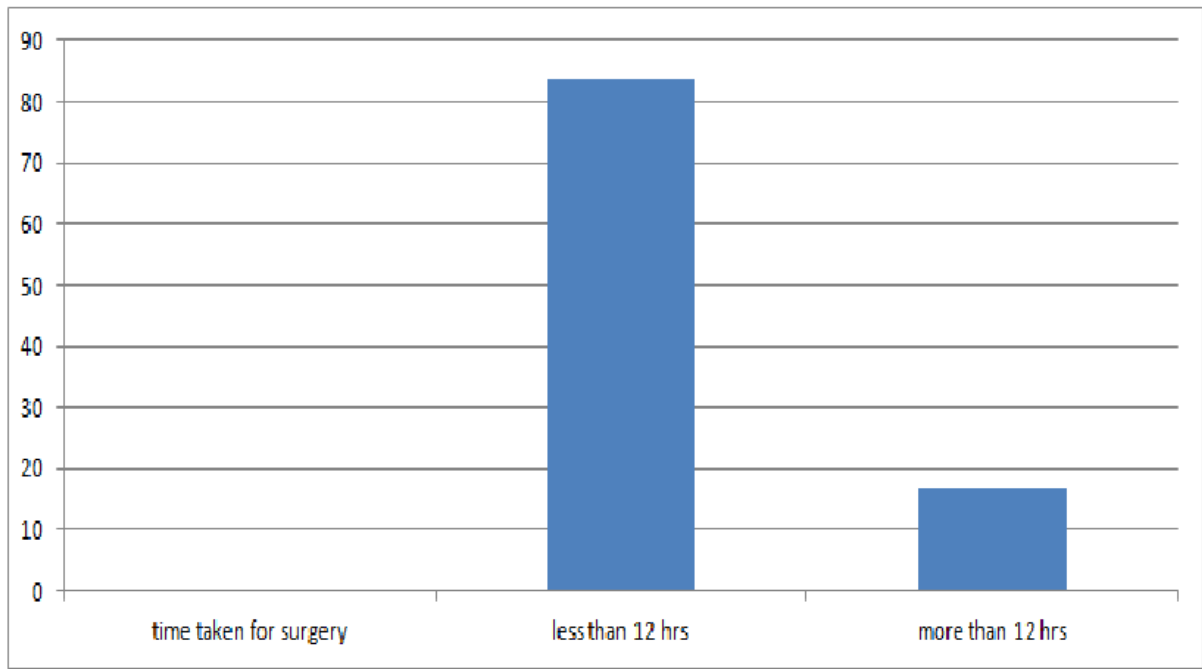


Figure 3 : Time taken for resuscitation, diagnosis and preparation for surgery was less than 12 hours in 83.4% cases and more than 12 hours in 16.6% cases

Most common symptom with which patient presented was abdominal pain(99%). Site of pain presentation varied with site of perforation. Peptic perforation presented mainly with epigastric pain followed by diffuse abdominal pain, appendicular perforation cases presented initially with either periumbilical pain or right iliac fossa pain. Small bowel

and large bowel perforation usually presented with diffuse abdominal pain. Other symptoms included nausea in 92% cases and one or more episodes of vomiting in 85% of cases. Patients also presented with abdominal distension(71%), fever(64%) and altered bowel habit(42%). 12% patients were in shock at the time of initial presentation.(figure 4)

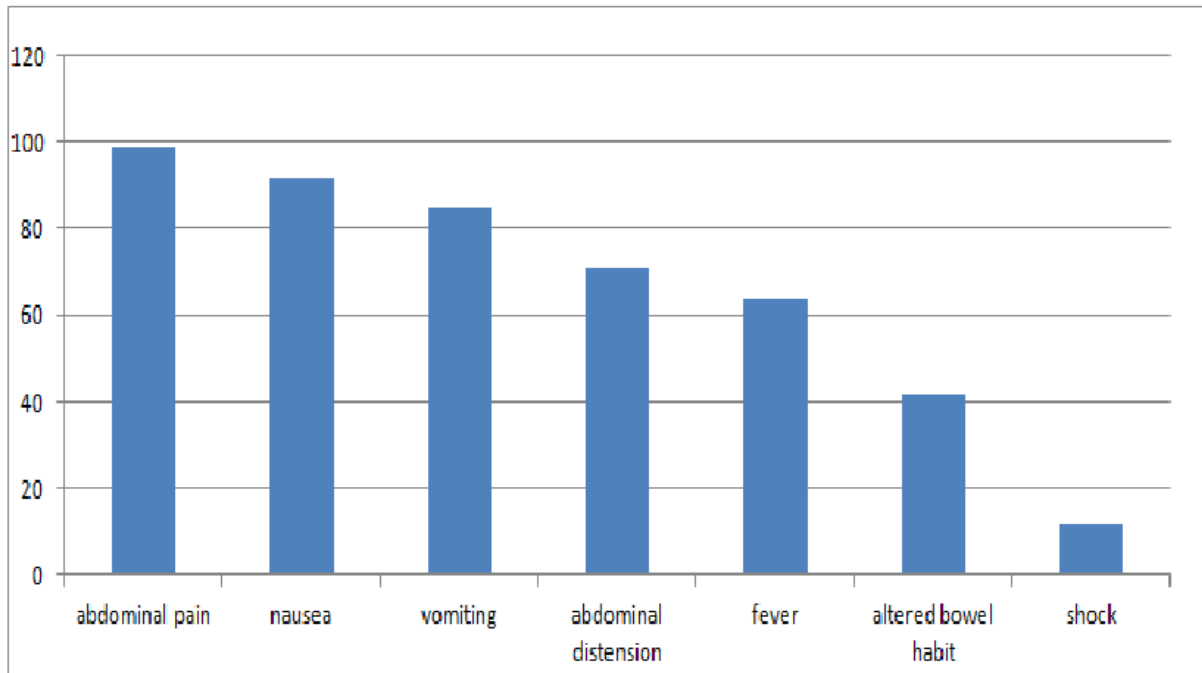


Figure 4 : Table showing clinical presentation – abdominal pain in 99%, nausea in 92%, vomiting in 85%, abdominal distension(71%),fever(64%),altered bowel habit(42%) and 12% patients were in shock

77% patients had pneumoperitoneum on erect chest x ray and 11% patients had multiple air fluid levels noted on abdominal x rays. Other Investigations

revealed anemia (18%), leucocytosis (44%), hyponatremia (48%), hypokalemia (52%), elevated urea (29%) and creatinine levels (11%).(figure 5)

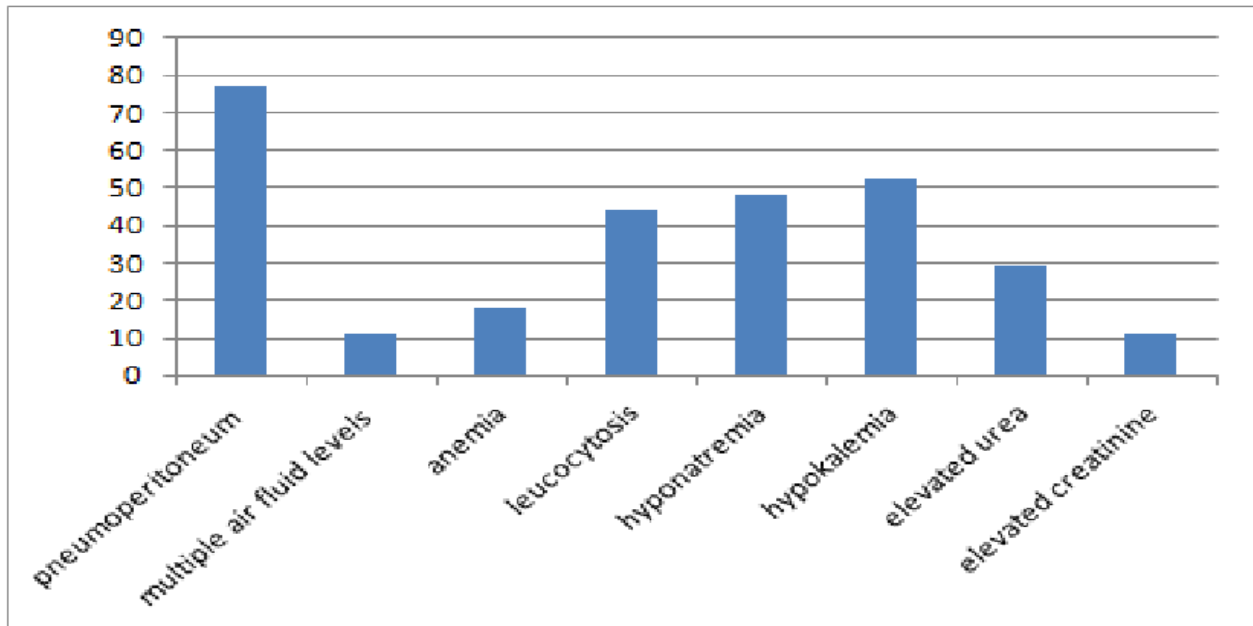


Figure 5 : Table showing investigations-77% had pneumoperitoneum, 11% had multiple air fluid levels, anemia (18%), leucocytosis (44%), hyponatremia (48%), hypokalemia (52%), elevated urea (29%) and creatinine levels(11%)

Most common site of perforation noted was duodenum (35.8%) followed by ileum(27.6%). Other sites included gastric (0.85%), esophageal (0.14%), jejuna (13.3%), appendicular (18.4%) and colonic perforation (3.8%). Patients presenting with duodenal perforation mostly had acid peptic disease and history

of NSAID intake. Ileal perforation patients predominantly followed typhoid or tuberculosis. Jejunal perforation was seen in patients with blunt trauma abdomen. Malignancy was commonly seen in patients with colonic perforation.(figure 6)

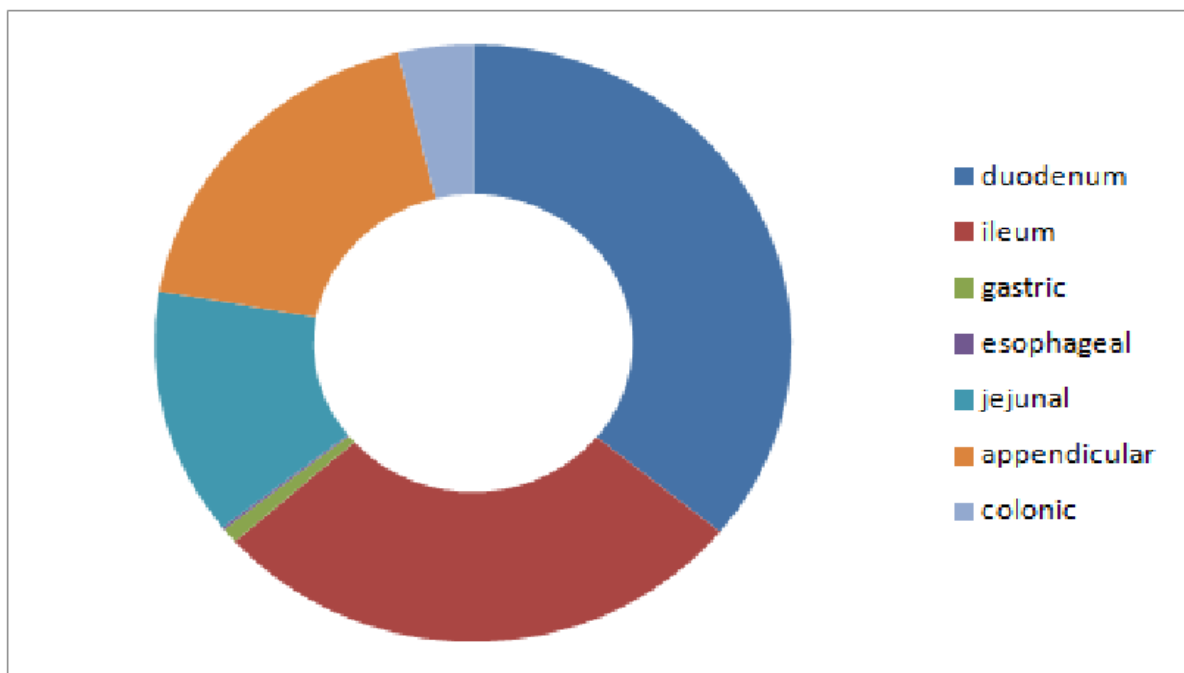


Figure 6 : Figure illustrating sites of perforations - duodenum(35.8%), ileum(27.6%), gastric(0.85%), esophageal(0.14%), jejunal(13.3%), appendicular (18.4%) and colonic perforation(3.8%)

Acid peptic disease was most common cause of gastroduodenal perforations(93%). Blunt trauma abdomen was most common etiology behind jejunal perforations(96%). Typhoid (64%) and tuberculosis(31%) mainly resulted in ileal perforations. Malignancy(77%) was most common etiology behind colonic perforations.

Primary repair was done in 49.6% cases. 11% cases required resection and anastomosis while 21% required resection without anastomosis (ileostomy, colostomy and hartmann procedure). Appendicectomy was done in 18.4% cases.(figure 7)

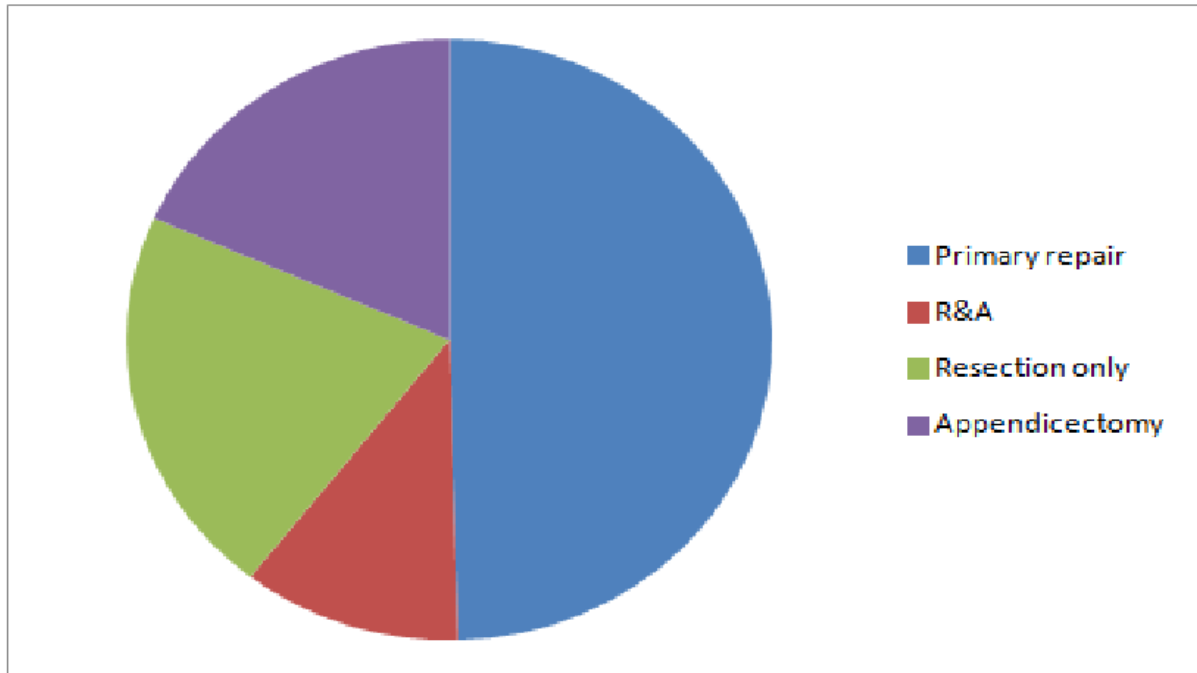


Figure 7 : Procedures done for perforations - Primary repair in 49.6% cases, 11% had resection and anastomosis, 21% required resection without anastomosis (ileostomy, colostomy and hartmann procedure) and Appendicectomy was done in 18.4% cases

Complications included wound infection(31%), electrolyte imbalance(19%), pneumonia (23%), septic-aemia (9%), renal failure(8%), intraabdominal abs-

cess(6%), anastamotic leak(0.5%).Overall mortality was 7.2%.(figure 8)

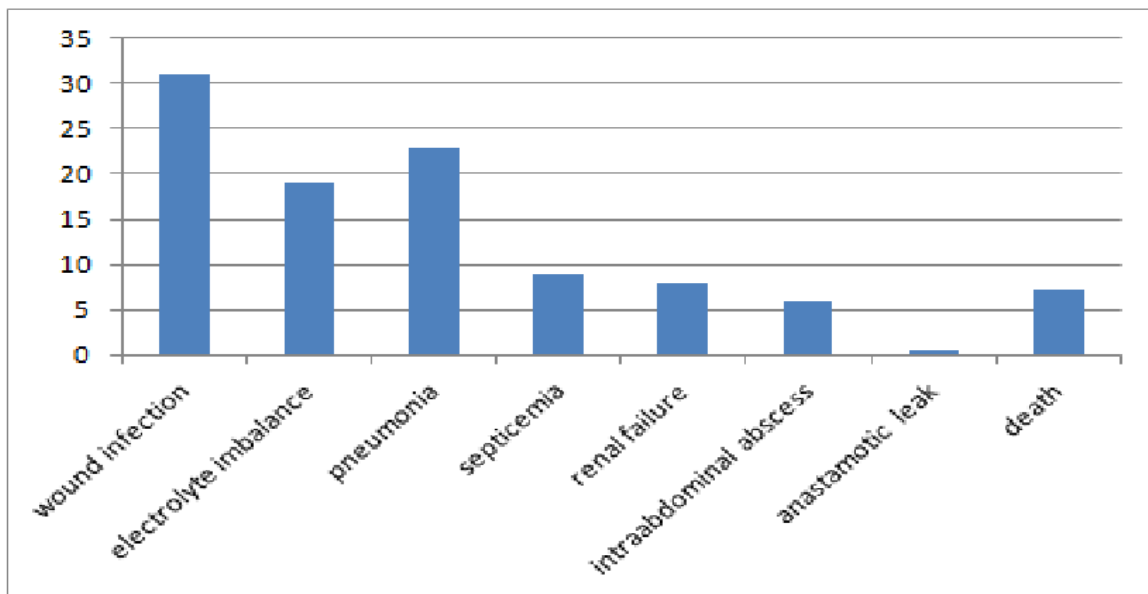


Figure 8 : Complications - wound infection(31%), electrolyte imbalance(19%), pneumonia(23%), septicaemia(9%), renal failure(8%), intraabdominal abscess(6%), anastamotic leak(0.5%). Overall mortality was 7.2%

IV. DISCUSSION

Perforation peritonitis is one of the most important cause of general surgical emergency. In our study of 1400 cases, over 3 years, we noticed mean age of presentation was 32 years with male to female ratio of 2.8. In a study by Adesunkamni et al, they found out that M:F ratio was 3:1 with the overall mean age of 27.6 ± 18.3 years.(1)

Patients of perforation peritonitis often presents late to hospital particularly in developing countries like India due to illiteracy, ignorance and lack of adequate medical facilities as is seen in our study where 62% cases came to hospital after 24 hours of onset of their symptoms. By the time the patient presents, he has all typical features of generalized peritonitis with purulent or fecal contamination and many a times patient is in septicaemia with or without shock.

Dorairajan et al conducted study on perforation peritonitis in which they showed the six times higher prevalence of proximal gastrointestinal perforations as compared to perforations of distal gastrointestinal tract.(2) In our study, majority of perforations were in duodenum (35.8%) followed by ileum(27.6%). This was in contrast with data from western world where distal gastrointestinal perforations were more common.(3) Duodenal ulcer Perforation was the most common perforation noticed in our study. Similarly, Gupta S and Kaushik R in their study showed duodenal ulcers in its first part to be the overall most common cause of perforation peritonitis.(6)

Khanna et al from Varanasi studied 204 cases of gastrointestinal perforation and found that 108 cases with perforation were due to typhoid and other common pathology included were amoebiasis and tuberculosis. (4) Similarly in our study, we had high incidence of typhoid(64%) and tubercular(31%) ileal perforations. This was in contrary to the western world where a study done in Texas by Noon et al[5] showed almost 50% of cases of gastrointestinal perforation were due to penetrating trauma and not due to infective pathology.

Patients with gastric perforations presents with long term history of NSAIDS intake. Otherwise, it is rare for a gastric ulcer to perforate. (7)

Small bowel tuberculosis presents mainly with features of obstruction due to the luminal narrowing caused by hyper plastic tuberculosis and strictures. Multiple ileal perforations are seen in ulcerative type of tuberculosis.(8) Tubercular perforations can be primarily closed or may require stoma formation if associated with poor general condition of the patient or with excessive fecal contamination. Patient may have associated multiple non passable strictures which may require stricturoplasty at the same time. Decision for the type of management is more or less similar for typhoid enteric perforations and is dependent upon patients general condition and degree of contamination.

With the advent of better surgical care mortality rates in perforation peritonitis have decreased but still it is an important cause of mortality in patients operated in emergency theatres as shown in study by Gupta et al and Ohene Yeboah et al where overall mortality ranges between 6–27% (6,7), where as those associated with gastric perforation were 36% (9), enteric perforation were 17.7% (10) and colorectal perforation were 17.5% (11).

Reasons attributed behind this high mortality rates were delayed presentation which is further aggravated by delay in diagnosis and treatment, which results in high chances of patient developing septic-aemia. Advanced age, associated comorbid and respiratory complications worsens the situation.(12)

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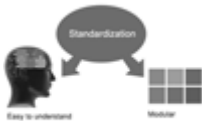
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32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.



Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

- Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

- Use standard writing style including articles ("a", "the," etc.)
- Keep on paying attention on the research topic of the paper
- Use paragraphs to split each significant point (excluding for the abstract)
- Align the primary line of each section
- Present your points in sound order
- Use present tense to report well accepted
- Use past tense to describe specific results
- Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives
- Shun use of extra pictures - include only those figures essential to presenting results

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Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.



Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript-- must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for brevity. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As an outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an abstract must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.



- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
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This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

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- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently. You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.



Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
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The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

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- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.



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<i>Methods and Procedures</i>	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
<i>Result</i>	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
<i>Discussion</i>	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
<i>References</i>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



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