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Morphometrical Study

Scapular Glenoid Cavities

Highlights

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Elective Orthopedic Surgery

Discovering Thoughts, Inventing Future

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Concurrent Rupture of the Patellar Tendon with Contralateral Patella Fracture

By Faik Turkmen, Cem Sever, Ismail Hakki Korucu, Burkay Kacira
& Fahri Yurtgun, Serdar Toker
Necmettin Erbakan University, Turkey

Abstract- Patella fractures and patellar tendon ruptures are mainly due to trauma. Concurrent bilateral patella fracture or concurrent bilateral patellar tendon rupture are even rare. There are case reports that describe concurrent bilateral patella fracture or concurrent bilateral patellar tendon rupture in the literature. This study reports a case of a 23-year-old man who suffered concurrent patella fracture with contralateral patellar tendon rupture due to fall from height by a lift. To our knowledge, this case report describes the first concurrent patellar tendon rupture with contralateral patella fracture.

GJMR-H Classification: *NLMC Code: WE 175*

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Concurrent Rupture of the Patellar Tendon with Contralateral Patella Fracture

Faik Türkmen [α], Cem Sever [σ], İsmail Hakkı Korucu [ρ], Burkay Kaçıra [ω], Fahri Yurtgün [¥] & Serdar Toker [§]

Abstract- **Patella fractures and patellar tendon ruptures are mainly due to trauma. Concurrent bilateral patella fracture or concurrent bilateral patellar tendon rupture are even rare. There are case reports that describe concurrent bilateral patella fracture or concurrent bilateral patellar tendon rupture in the literature. This study reports a case of a 23-year-old man who suffered concurrent patella fracture with contralateral patellar tendon rupture due to fall from height by a lift. To our knowledge, this case report describes the first concurrent patellar tendon rupture with contralateral patella fracture.**

I. Introduction

There are case reports that describe bilateral patella fractures or bilateral patellar tendon ruptures in the literature. Patella fractures and patellar tendon ruptures are mainly due to trauma. Both injuries affect the extensor mechanism of the knee because both of anatomical structures contribute knee extension. Other anatomical parts that participating in knee extension are quadriceps muscle, quadriceps tendon, and tibial tubercle. Patellar tendon ruptures are less common than quadriceps tendon ruptures and patella fractures[1].

In this study we present the case of a concurrent patellar tendon rupture with contralateral patella fracture as a result of fall from height by a lift. To our knowledge, this case report describes the first concurrent patellar tendon rupture with contralateral patella fracture.

II. Case Report

A 23-year-old man was transported to our emergency department after falling from height by lift. He complained of pain in both knees, both arms, and both hands. There were no obvious past systemic or local disease in patient's history. On phsical examination, there were swelling and tenderness at both knees, both arms, and both hands. He was unable to actively extend his knees. Bilateral patella alta without any skin wound was noted. There was a palpable gap below the left patella and on the right patella. Knee x-rays demonstrated patella alta at the left knee and patella distal pole fracture at the right knee (Fig. 1a,b). Rupture of the patellar tendon in his left knee was considered. Simultaneously bilateral humerus shaft fracture and bilateral multiple metacarpal fractures were revealed on x-ray examination.

Figure 1a : Left knee patella alta

Figure 1b : Right knee patella distal pole fracture

Rupture of the patellar tendon just below the inferior pole of the left patella was seen during surgery. Patellar tendon was reattached to the patella by two

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titanium bone anchors. Small distal fragment of the right patella was exised and patellar tendon reattached to the patella by two titanium bone anchors. Open reduction and internal fixation was performed for bilateral humerus and bilateral multiple metacarpal fractures. Both knees were immobilized for 6 weeks postoperatively in knee braces, in extension. After removing braces, rehabilitation program was begun. The left patellar tendon was found avulsed from the patella on the examination at the end of the third month. Patellar tendon reconstruction with autogenic hamstring tendons was performed. Knee was immobilized for 6 weeks in knee brace, in extension. Brace was removed after the end of 6 weeks and rehabilitation program was begun. The quadriceps muscle strength and 90º-100º knee flexion on the right side was regained five months after the initial injury. Rehabilitation program was continued on the left side and 40º knee flexion was regained two months after reconstruction surgery (Fig. 2a and b).

Figure 2a : Left knee postoperative lateral view

Figure 2b : Right knee postoperative lateral view

III. Discussion

Quadriceps muscle, quadriceps tendon, patella, patellar tendon, and tibial tubercle constitute the knee extensor mechanism. Injury of any of these structures causes deterioration of knee extension. Patella fracture is the most common ones in these injuries[2]. The second one is quadriceps tendon injury and the third one is patellar tendon injury[3].

The patella is the largest sesamoid bone in the body. It increases the muscle moment arm of the extensor mechanism. Patella fractures may be caused by an excessive tension or a direct trauma. These injuries result insufficiency of the knee extensor mechanism if effective treatment was not applied. Surgical treatment should be applied for displaced patella fractures.

Patellar tendon is one of the strongest structures of the body. Zernicke et al[4] found that a force 17.5 times of the body weight was necessary to rupture a healthy patella tendon in a young individual. Patellar tendon injury is typically unilateral and occurs in individuals younger than 40 years. Overloading the extensor mechanism and to have a history of tendinitis may cause patellar tendon injury[5,6]. A sudden significant eccentric contraction precipitate patellar tendon rupture [7]. Surgical repair is necessary for complete rupture of the patellar tendon.

Patella fractures and patellar tendon ruptures may occur without direct trauma. An eccentric contraction of the quadriceps during a fall may cause a patella fracture [8]. In analogy to this mechanism contraction of the quadriceps in a flexed knee may result in patellar tendon rupture. Strong opposite contractile forces create moment arms in opposite directions.

Patellar tendon rupture occurs when these forces are strong enough [6].

Concurrent bilateral patella fracture or concurrent bilateral patellar tendon rupture are even rare. There are case reports that describe concurrent bilateral patella fracture or concurrent bilateral patellar tendon rupture in the literature. This study reports a case of a 23-year-old man who suffered concurrent patella fracture with contralateral patellar tendon rupture due to fall from height by a lift. A literature search was performed, however there was no such a case in the literature. To our knowledge, this case report describes the first concurrent patellar tendon rupture with contralateral patella fracture. Moment arms in opposite directions due to strong and sudden contraction of both quadriceps' in his flexed knees while hitting to floor was thought to be the cause of this rare injury.

In summary simultaneous patellar tendon rupture with contralateral patella fracture may occur due to sudden significant eccentric contraction of bilateral quadriceps'. Knee extensor mechanism injury should be considered in a patient who is unable to actively extend one or both knees. An accurate diagnosis must be made by a careful and detailed physical examination with x-rays. MRI and ultrasonography should be performed in suspected cases.

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Morphometrical Study of Scapular Glenoid Cavities

By Dr. Girish V.Patil, Dr. Sanjeev I. Kolagi & Dr. Umesh Ramdurg
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Abstract- Shape and dimensions of the glenoid cavity are important in the design and fitting of glenoid components for total shoulder arthroplasty. An understanding of variations in normal anatomy of the glenoid is essential while evaluating pathological conditions like osseous bankart lesions and osteochondral defects.

In the present study done on 224 dry scapulae, three glenoid diameters were measured. The average superior-inferior diameter on right and the left side were 33.68±4.32mm and 32.09±4.11mm respectively. The average anterior-posterior diameter of the lower half of the right glenoid was 23.29±2.34mm and that of the left glenoid was 24.90±2,95mm. the mean diameter of the upper half of the right glenoid was 15.74±1.75mm and that of the left glenoid was 16.81±1.74mm.

The left glenoid cavity was slightly shorter in length, but broader especially in the upper part as compared to the left glenoid cavity.

The current study also recorded a higher percentage of glenoid cavities having the glenoid notch in the anterior margin of the glenoid as compared to earlier studies. While evaluating defects and lesions of the glenoid, this fact could be useful.

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The current study also recorded a higher percentage of glenoid cavities having the glenoid notch in the anterior margin of the glenoid as compared to earlier studies. While evaluating defects and lesions of the glenoid, this fact could be useful.

Smaller dimensions of the glenoid cavities in the south Indian population may have to be taken into consideration while designing and fitting glenoid components while performing total shoulder arthroplasty.

I. Introduction

The scapula is an integral part of the connection between the upper extremity and the axial skeleton. Lateral angle of the scapula is a shallow, pyriform articular surface- the Glenoid cavity, also known as Glenoid fossa of the scapula. Glenoid cavity is directed laterally and forward and articulates with the head of the humerus and form Gleno-humeral joint. The vertical diameter of the Glenoid cavity is the longest and it is broader below than above. The surface is covered with hyaline cartilage in the fresh state and its slightly raised margins give attachment to a fibrocartilaginous structure- the glenoid labrum which deepens the cavity (Richard LM, Newell 2005[1]).

Shoulder joint between shallow glenoid fossa and hemispherical head of humerus is a ball and socket type of synovial joint. It has maximum movement but less stability. The factors contributing to stability the shoulder joint are the deepening of the glenoid cavity by the glenoid labrum; the suprahumeral support provided by the coracoacromial arch, the capsule is strengthened by the fusion of tendons of rotator cuff muscles and glenohumeral and coracohumeral ligaments.

Shoulder joint is frequently dislocated inferiorly due to having less support in that region of the joint. During trauma,dislocation with fracture of glenoid are also common. During treatment repair of the labrum and reinforcing the capsule by an overlapping repair and rearrangement of anterior muscle, total shoulder replacement is also being used as treatment (Chummy S. Sinnatomby 20062).

Total shoulder arthroplasty has proven to provide predictable improvement in pain and function in patients with a degenerative shoulder joint and an intact rotator cuff.

Various shapes of the glenoid cavity have been described based on the presence of a notch on anterior glenoid rim. It has been found that if the notch is distinct then the glenoid labrum is not fixed to the bony margin of the notch but bridges the notch itself. This could make the shoulder joint less resistant to dislocating forces (Prescher A. and Klmpen T. 19973)

Because of unusual and complex morphology features of the scapula, and the lack of complete quantitative anatomic studies, the current study was undertaken to describe the glenoid cavity quantitatively with its dimensions and shape.

II. Materials

This study was done on 224 dry, unpaired adult human scapulae of unknown sex obtained from department of Anatomy Srinivas Institute of medical Sciences, Mangalore. Scapula having clear and intact glenoid cavity were selected for the study. All the measurements were taken in millimeters using sliding calipers.

III. Methods

The following parameters were studied in the glenoid cavity of the dry scapula

1. Superior-Inferior glenoid diameter (SI): Represents the maximum distance from the inferior point on the glenoid margin to the most prominent point of the supraglenoid tubercle.
2. Anterior-Posterior glenoid diameter (AP-1): Represents the maximum breadth of the articular margin of the glenoid cavity perpendicular to the glenoid cavity height.

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3. Anterior-Posterior glenoid diameter (AP-2): Represents the anterior-posterior diameter (Breadth) of the top half of the glenoid cavity at the mid-point between the superior rim and the mid-equator.
4. Shape of the glenoid cavity: A piece of white sheet was placed on the glenoid cavity and held firmly in position to trace the shape of the glenoid cavity. The side of the point of a lead pencil was rubbed along the rim of the glenoid cavity to get a tracing of the shape of the glenoid cavity on the paper.

IV. Stastical Evaluation

The mean and standard error of the glenoid cavity in various dimensions were calculated. The morphometric values of both sides were analyzed using an unpaired t-test.

V. Observation and Results

In 224 dry scapulae, 104 belonging to the right side and 120 to the left side. Abbreviations used in the following tables are

1. SI- superior inferior glenoid diameter
2. AP 1- anterior- posterior glenoid diameter (maximum breadth of the articular surface)
3. AP 2- anterior –posterior glenoid diameter of the upper half of the glenoid cavity.
4. SD – standard deviation
5. P – P value
6. mm- millimeters

Table 2 : comparison of the SI diameter of the right and left side

Sl.No	Points	Right	Left
1	Number of bones	104	120
2	Range	25 to 42	25 to 42
3	Mean	33.68	32.09
4	Standard deviation	4.32	4.11
5	Statistical significance	t =31.8, P<0.001	

In the present study, the superior – inferior diameters of the glenoid cavity on the right side varied from 25 to 42 mm, with an average of 33.68±4.32mm. on left side the superior –inferior diameter from 25 to 42, with a mean of 32.09±4.11mm.

Statistically Highly significant value was found while comparing the SI diameters of the right glenoid with that of the left glenoid cavity (P<0.001)

Table 3 : comparison of the AP-1 diameter of the right and left side

Sl.No	Points	Right	Left
1	Number of bones	104	120
2	Range	17 to 27	17 to 28
3	Mean	23.29	24.90
4	Standard deviation	2.34	2.95
5	Statistical significance	t =20.32, P<0.001	

In this study, the AP 1- glenoid diameter of the right and left sides varies from 17 to 27mm and 17 to 28mm respectively. The average maximum breadth of the right glenoid was 23.29±2.34mm and the maximum breadth of the left glenoid was 24.90±2,95mm.

Statistically Highly significant value was found while comparing the AP 1 diameter of the right glenoid with that of the left glenoid (P<0.001).

Table 4 : comparison of the AP-2 diameter of the right and left side

Sl.No	Points	Right	Left
1	Number of bones	104	120
2	Range	12 to 20	12 to 21
3	Mean	15.74	16.81
4	Standard deviation	1.75	1.74
5	Statistical significance	t =53.5, P<0.001	

The range for the AP2 diameter of the glenoid cavity was 12 to 20mm and the mean for the same was 15.74±1.75mm. the AP2 diameter for the left glenoid varied from 12 to 21mm, while the mean for the left glenoid was 16.81±1.74mm.

While comparing the AP2 diameter of the right and left glenoid cavities, statistically important difference was found (P<0.001).

While examining the various shapes of the glenoid cavity in the present study. It was found that the

shapes could mainly be of 3 types. It was classified as inverted comma shaped if the anterior glenoid notch was distinct, as pear shaped if the anterior glenoid notch was indistinct and as oval shaped if the anterior glenoid notch was absent.

Table 5 : Table showing number and incidence of various shapes of the right glenoid cavity

Number of bones	Shape of glenoid	Incidence of shape
36	Inverted comma	34.62%
49	Pear	47.12%
19	Oval	18.27%
Total- 104	-	-

On the right side out of the total 104 glenoid cavities examined 36 were found to have inverted comma shape. And the incidence of this shape was calculated to be 34.62%. the number of glenoids having pear shape on the right side was 49 and the incidence was found to be 47.12%.oval glenoid cavities were 19 in number on the right side and the incidence was 18.27%.

Table 6 : Table showing number and incidence of various shapes of the left glenoid cavity

Number of bones	Shape of glenoid	Incidence of shape
39	Inverted comma	32.5%
54	Pear	45.0%
27	Oval	22.5%
Total- 120	-	-

On the left side, glenoids with the inverted comma shape were 39 in number out of the total 120 scapulae examined. The incidence of inverted comma shaped glenoid was 32.5%. 54 glenoids on the left side were found to have the pear shape and incidence of pear shaped glenoid was 45%. The oval glenoid cavities were 27 in number and the incidence of oval glenoid was 22.5%.

VI. Discussion

In the present study an effort has been made to find the average diameters of the glenoid cavity of the scapula and the incidence of various shapes of the glenoid cavity in the south Indian population. Several authors have attempted to determine the glenoid diameters in the course of their research. This has been performed in a variety of ways, including direct measurement of dry scapulae, direct measurement of fresh or embalmed cadavers, radiographic measure-ement of scapulae harvested from cadavers and radiographic measurement in living patients. These studies have been performed on different populations. In evaluating the data presented in this study, a comparison to work by others reveals several differences as well as similarities

Table 7 : comparison of superior-inferior diameter by various authors

Observers	No of specimens	Mean SI diameter
Mallon4 et al (1992)	28	35±4.1mm
Iannotti5 et al (1992)	140	39±3.5mm
Von Schroeder6 et al (2001)	30	36±4mm
Churchill7 et al (2001)	Male 200 Female 144	37.5±2.2mm 32.6±1.8mm
Luis Rios Frutos8 (2002)	Male- 65 Female 38	36.08±2.0mm 31.17±1.7mm
Ozer et al9 (2006)	Male 94 Female 92	38.71±2.71mm 33.79±3.08mm
Karelse et al10 (2007)	40	35.9±3.6mm
Present study	Right 104 Left 120	33.68±4.32mm 32.09±4.11mm

Table 8 : comparison of superior-inferior diameter by various authors

Observers	No of specimens	Mean SI diameter
Mallon et al (1992)	28	24±3.3mm
Iannotti et al (1992)	140	29±3.2mm
Von Schroeder et al (2001)	30	28.6±3.3mm
Churchill et al (2001)	Male 200 Female 144	27.8±1.6mm 23.6±1.5mm

Luis Rios Frutos (2002)	Male- 65 Female 38	26.31±1.5mm 22.31±1.4mm
Ozer et al (2006)	Male 94	27.33±2.4mm
	Female 92	22.72±1.72mm
Karelse et al (2007)	40	27.2±3mm
Present study	Right 104 Left 120	23.29±2.34mm 24.90±2.95mm

Table 9 : Comparison of the anterior –posterior (AP-2) diameter by various authors

Observers	No of specimens	Mean AP2 diameter
Iannotti et al (1992)	140	23±2.7mm
Present study	Right 104 Left 120	15.74±1.75mm 16.81±1.74mm

Table 10 : Comparison of percentage of occurrence of glenoid notch by various authors

Observers	% of glenoid with notch (inverted comma + pear shaped)	% of glenoids without notch (oval)
Prescher A and Klumpen T (1997)	Right + left – 55%	Right + left – 45%
Present study (2011)	Right – 81.74% Left- 77.5%	Right – 18.27% Left- 22.5%

VII. Summary and Conclusion

Knowledge of the shape and dimensions of the glenoid are important in the design and fitting of glenoid components for total shoulder arthroplasty. An understanding of variations in normal anatomy of the glenoid is essential while evaluating pathological conditions like osseous bankart lesions and osteochondral defects.

In the present study done on 224 dry scapulae, three glenoid diameters were measured. The superior-inferior, anterior-posterior diameter of the lower half of the glenoid and the anterior-posterior diameter of the upper half of the glenoid. The average superior-inferior diameter on right and the left side were 33.68±4.32mm and 32.09±4.11mm respectively. The average anterior-posterior diameter of the lower half of the right glenoid was 23.29±2.34mm and that of the left glenoid was 24.90±2,95mm. The mean diameter of the upper half of the right glenoid was 15.74±1.75mm and that of the left glenoid was 16.81±1.74mm.

The left glenoid cavity was slightly shorter in length, but broader especially in the upper part as compared to the right glenoid cavity.

The current study also recorded a higher percentage of glenoid cavities having the glenoid notch in the anterior margin of the glenoid as compared to earlier studies. While evaluating defects and lesions of the glenoid, this fact could be useful.

By observing the tables in the discussion it can be implied that the values observed in the present study, through coinciding with that of some of the studies are mostly less than that recorded by many of the observers. This implies that the smaller dimensions of the glenoid cavities in the south Indian population may have to be taken into consideration while designing and fitting glenoid components while performing total shoulder arthroplasty in this population,

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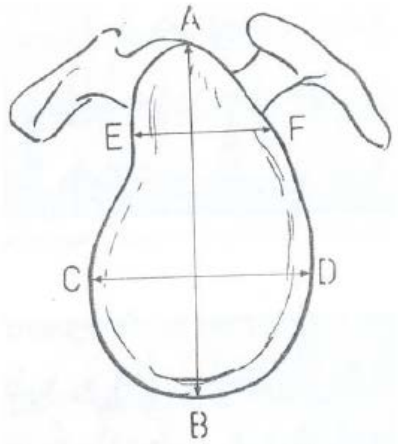

. Diameters of the glenoid cavity

Inverted comma-shaped glenoid

Oval-shaped glenoid

Pear-shaped glenoid

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NATA Guidelines in Elective Orthopedic Surgery (Our Experience)

By Mirka Lukić-Šarkanović, Ljiljana Gvozdenović & Matilda Vojnović
Medical University Novi Sad, Serbia

Abstract- *Introduction:* Previously undiagnosed anemia is common in elective orthopedic surgery and is associated with increased likelihood of blood transfusion, as well as increased perioperative morbidity and mortality. A multidisciplinary panel of physicians was convened by the Network for Advancement of Transfusion Alternatives (NATA) with the aim of developing practice guidelines for the detection, evaluation and management of preoperative anemia in elective orthopedic surgery.

Methods and results: The following recommendations were made for the patients scheduled for the orthopedic surgery: 1. The hemoglobin level was estimated to be based on at least 28 days before the planned orthopedic surgery, 2. Preoperative hemoglobin level recommended for women ≥120g/l and for men ≥130g/l, 3. In case of the existence of anemia, the immediate implementation of laboratory testing to determine the cause of anemia was recommended, 4. Any nutritional deficiency should be compensated 5.

Conclusion: Use of stimulators of erythropoiesis is recommended.

Keywords: *anemia, blood transfusion, preoperative assessment.*

GJMR-H Classification: *NLMC Code: WE 168*

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Mirka Lukić-Šarkanović [α], Ljiljana Gvozdenović [σ] & Matilda Vojnović [ρ]

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I. Introduction

According to the WHO criteria (World Health Organization) satisfactory hemoglobin levels are ≤ 120 g / l for women and ≤ 130 g / l for men. Severe anemia is defined as hemoglobin ≤ 100 g / l (1).In the overall population, prevalence of anemia increases with age. People older than 65 years are more likely to be anemic (1, 2).In adult surgical patients, the incidence of preoperative anemia varies from 5 to 75%, depending on the age and gender of patients, type of surgery and the criteria for determining anemia. Numerous studies have shown that more than 20% of patients admitted for planned surgery are anemic (2).According to a large national study in the United States (U.S.), 35% of patients who were subjected to planned orthopedic surgery had preoperative hemoglobin less than 130 g / l. Most of the patients were women and one-third had iron deficiency (2, 3, 4).

During a large retrospective study investigated in 1958 for Jehovah's Witnesses (religious group that does not want to accept someone else's blood transfusion for the purposes of treatment) undergoing non-cardiac surgery, it was noted that the value of preoperative hemoglobin ≤ 100 g / l is associated with a significant increase in perioperative mortality. More significantly, perioperative mortality is increased in cardiovascular patients because these patients are less able to tolerate anemia (5). In his research, Rashig has shown thatthe preoperative hemoglobin level ≥ 130 g / l and hematocrit ≥ 30% reduce the use of perioperative transfusion of allogeneic blood for more than 90% (6). Similar results were obtained by Lawrence. In his studies he showed that high preoperative hemoglobin levels significantly improve the postoperative recovery of patients (7).After surgery and trauma inflammatory cytokines that reduce ironrelease from the gastrointestinal tract are secreted, reducing sequestration of iron in macrophages, decreasing production of erythropoietin in the kidney and giving rise to anemia.

Network for Advancement of Transfusion Alternatives (NATA) provides recommendations for detection, evaluation and treatment of preoperative anemia. These recommendations were developed by experts from several fields who deal with blood transfusion for planned surgical procedures in orthopedic surgery, expected blood loss, and the need for allogeneic blood transfusion (11). Application of substances that stimulate hematopoiesis in patients undergoing major surgical procedures, patients with chronic renal failure, patients with anemia due to malignancy, and patients undergoing chemotherapy is fully justified. In clinical practice, recombinant human erythropoietin rHuEPOis being used more often (16, 17). Use of erythropoietin andcompensation of iron deficiency substantially correct preoperative anemia, reduce allogeneic blood transfusion and, indirectly, reduce perioperative morbidity and mortality, and therefore the total cost of treatment of patients (17).

Today, allogeneic blood transfusion is a significantly safer method, but its implementation is still associated with the emergence of numerous complications such as significant increase in perioperative morbidity and mortality, number of days spent in the hospital and the total cost of treating patients. To avoid these complications, in recent decades, need for timely and appropriate diagnosis, evaluation and treatment of preoperative anemia is crucial.

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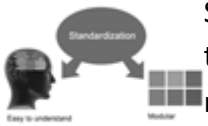

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(e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition; sources of information must be given and numerical methods must be specified by reference, unless non-standard.

(f) Results should be presented concisely, by well-designed tables and/or figures; the same data may not be used in both; suitable statistical data should be given. All data must be obtained with attention to numerical detail in the planning stage. As reproduced design has been recognized to be important to experiments for a considerable time, the Editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned un-refereed;

(g) Discussion should cover the implications and consequences, not just recapitulating the results; conclusions should be summarizing.

(h) Brief Acknowledgements.

(i) References in the proper form.

Authors should very cautiously consider the preparation of papers to ensure that they communicate efficiently. Papers are much more likely to be accepted, if they are cautiously designed and laid out, contain few or no errors, are summarizing, and be conventional to the approach and instructions. They will in addition, be published with much less delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and to make suggestions to improve briefness.

It is vital, that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

Format

Language: The language of publication is UK English. Authors, for whom English is a second language, must have their manuscript efficiently edited by an English-speaking person before submission to make sure that, the English is of high excellence. It is preferable, that manuscripts should be professionally edited.

Standard Usage, Abbreviations, and Units: Spelling and hyphenation should be conventional to The Concise Oxford English Dictionary. Statistics and measurements should at all times be given in figures, e.g. 16 min, except for when the number begins a sentence. When the number does not refer to a unit of measurement it should be spelt in full unless, it is 160 or greater.

Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than 1.4 × 10-3 m3, or 4 mm somewhat than 4 × 10-3 m. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

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Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:

- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

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11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

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16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

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18. Pick a good study spot: To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

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20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

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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 though 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.

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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.

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- 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

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· 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

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- Fundamental goal
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- Significant conclusions or questions that track from the research(es)

Approach:

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- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
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- Report the method (not particulars of each process that engaged the same methodology)
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- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

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- Leave out information that is immaterial to a third party.

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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.

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- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
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Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
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- Give details all of your remarks as much as possible, focus on mechanisms.
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- Try to present substitute explanations if sensible alternatives be present.
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Criterion for Grading a Research Paper (Compilation)
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Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	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
Result	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
Discussion	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
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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