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# Effects of Blood Transfusion in Outcome of Elective Bowel Anastomosis

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**Abstract - Background :** Bowel anastomosis is one of the commonest procedure done in surgical practice, and its outcome influence by many factors include; patients, technical, and operation basis, but intraoperative blood transfusion (BT) is discriminated from other risk factors in that; its intentionally added risk factor.

**Objective :** To evaluate the effect of blood transfusion in outcome of elective bowel anastomosis in Khartoum teaching hospital.

**Patient And Method :** Twenty eight patients admitted into Khartoum teaching hospital, and underwent elective bowel anastomosis were enrolled in the study. Data was collected by questionnaire for each patient.

**Result :** The total number of patients was 28, 18 were male and 10 were female, mean age was 50 years, 14.3% were underwent small bowel anastomosis, 85.7% were underwent large bowel anastomosis, and 35.7% were transfused intraoperatively. Regardless other risk factors the incidence of surgical site infection (SSI) was significantly high in transfused patients, in comparison to nontransfused 30% vs 0.0%, also there was a high rates of other complications in transfused patients than those weren't.

**Conclusion :** Intraoperative blood transfusion is a good predictor for development of complications in elective bowel anastomosis.

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## I. INTRODUCTION

After discovery of ABO group, blood transfusion have become a common treatment for anemia and acute blood loss, its adverse effects had been notice in last decades, especially the immunosuppression one.<sup>1</sup>

Blood transfusion alter both local and systemic immune response to injury, it impair lymphocyte and macrophage function, blastogenesis and interaction with other cells. Allogeneic leukocytes have a critical role in the induction of transfusion-induced immunosuppression, also BT decrease the production of interleukin -2 (IL2) which found to be an important factor in cell immunity and stimulation of healing.<sup>1,2,3</sup> These effects can be reverse by administration of exogenous IL2 in chronic healing, also some studies found that leucocytes-depleted blood doesn't impair healing.<sup>3,4,5</sup>

In bowel anastomosis blood transfusion increase incidence of abscess formation, reduce

collagen synthesis result in impair anastomotic strength, and high rate of anastomotic leak (AL).<sup>1,2,3,4,6,7,8</sup> Some studies reported that this effect related to intra and postoperative BT rather than preoperative transfusion, implies that its effect might be at least partially surrogated by other intraoperative factors, such as contamination and shock.<sup>2,9,10</sup>

Testini et al study found that; preoperative blood transfusion a causative factor in development of AL.<sup>11,15</sup> Also some study found that; high rate of complications related to massive blood transfusion in emergencies.<sup>12,13,14</sup>

Nevertheless blood transfusions are frequently required in gastrointestinal surgery to correct anemia or because of excessive blood loss from associated trauma or operative procedures. Thus, it is important to establish the effect of such transfusions on intestinal repair.

## II. PATIENTS AND METHODS

This a prospective descriptive hospital base clinical study, conducted in Khartoum teaching hospital (KTH), which is the biggest tertiary hospital in Khartoum, the capital of the Sudan, in the period from 15<sup>th</sup> Sep 2011 to Aug 1<sup>st</sup> 2012.

A total of twenty eight patients underwent elective bowel anastomosis, by general surgical units in (KTH) were enrolled in the study after consented. All large bowel anastomosis were preceded by bowel preparation, and all patients received single prophylactic dose of antibiotic, followed by a therapeutic course in postoperative period. Data was collected by structure questionnaire for each patient, from the date of operation till discharge from the hospital and for outpatient follow up for presence of complications, for at least first outpatient visit, variables included were; personal data, diagnosis, operative details, BT regardless the amount, presence of complications, postoperative bowel rest and hospital stay periods. Patients aged below twelve years, or had severe comorbidities were excluded from the study. Data was analyzed by computer using Statistical Package for Social Science (SPSS) program, version (16).

## III. RESULTS

Data analysis of twenty eight patients was done, all patients were underwent open, hand sewn elective bowel anastomosis, 62.3% were male and 37.3% were

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female, mean age was 50.39 years ( $\pm 15.17$ ) and rang from 22 to 75 years.

The indication of anastomosis was resection of bowel tumors in 64.3% (n=18) of patients; one was small bowel and 17 were large bowel tumors, in 28.5% (n=10) the indication was reversal of stoma; eight were colostomies and two were ileostomies, in one patient the indication was Crohns disease and in another one was chronic small bowel fistula.

Enteroenteric anastomosis was done in 14.3% of patients, enterocolonic in 50% and colocolonic in 35.7% of anastomosis, 85.7% (n=24) of anastomosis were accomplished by double layer technique and 14.3% (n=4) by single layer, sutures material was polyglycolic acid and needle was round bodied in all anastomosis.

Regarding blood transfusion 35.7% of patients were received whole blood intraoperatively, and 64.3% weren't transfused, we weren't considered the amount of blood. Contamination was presented in 21.4% of patients during operation.

Considering complications, the incidence of SSI was 10.7% (n=3), AL 3.6% (n=1), fistula 3.6%, and death 3.6%. All intraabdonial complications were developed in patients who were transfused intraoperatively.

Drainage of peritoneal cavity was done in 62.9% of operations, and 50% had nasogastric tube (NGT) decompression.

#### IV. DISCUSSION

The effect of blood transfusion (BT) in outcome of bowel anastomosis has been investigated by many studies, which proved its adverse impact in healing process and immunity of the host, that result in high rate of infectious complications and leakage, but it's necessary in certain circumstances such as shock and massive resection etc.<sup>1-14</sup> In our study all three SSI were developed in transfused group, with rate of 30% among this group ( $p=0.014$ ), which found to be a strong association, also in this group AL rate was 10% , fistula 10%, and mortality rate was 10%, and all other complications were developed in this group, which cited blood transfusion a cause in this group. (table2)

As other risk factors for complications such as malnutrition, cardiovascular and respiratory diseases weren't showed any significant difference in their rates between two groups, even some risk factors showed a higher rate in nontransfused group such as chemotherapy, smoking and alcohol abuse.(table1) In some studies the amount of blood found to be the risk (massive BT), rather than transfusion itself, unfortunately in our study we weren't considered neither the amount of blood nor intra operative hemorrhage degree as a separate risk factors for development of complications, and how much they affect the outcome was not provided in our results and analysis.<sup>12,13,14</sup>

Intraoperative contamination was found to be high in transfused group than nontransfused 30% vs 16.7%, which added a burden into this group, also our analysis revealed a strong association between BT and peritoneal drainage ( $p=0.007$ ), all patients received blood also were had a drain, but there was no significant association between peritoneal drainage and development of complications, it looks as surgeons were anticipated the development of AL in those patients received intraoperative whole blood. In Ketan et al study all AL were developed in transfused patients.<sup>3</sup> Lujan et al study found that; SSI and intraoperative blood transfusions were also associated with significantly higher rates of AL.<sup>7</sup>

Enterocolonic and colocolonic anastomosis followed by all SSI, fistula and leak in this study, and enteroenteric anastomosis wasn't developed complications, concluded the adverse effect of BT is more obvious in large bowel procedures than small bowel, this evidence was supported by Reiping et al study in large bowel anastomosis, also this study concluded that; BT is risk factor for SSI regardless the site of anastomosis in large bowel procedures.<sup>2</sup>

Considering postoperative fasting period there was no significant difference between two groups, the mean periods were four day in transfused patients, and five days in nontransfused, and hospital stay period was prolonged in transfused group, which was 11.56 days vs 8.22 days in nontransfused group, which found to be increased proportionally with development of complications.

There were some limitations in this study, as other risk factors might change the outcome by adding some burden into one group, and the effect of blood amount wasn't considered, so more precise studies have to be done to give more support to our results.

#### V. IN CONCLUSION

Intraoperative blood transfusion has adverse effects in elective bowel anastomosis, significantly increase rate of SSI; also it's a good predictor for development of other complications.

#### VI. AKNOWNLAGMENT

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