



## Case series

# Indications and Complications of Splenectomy: Experience of Kosti Hospital-White Nile State-Sudan

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## Abstract

**Background:** The spleen is an encapsulated hematopoietic organ that lies within the posterior aspect of the left upper quadrant in the peritoneal cavity; spleen is a part of reticuloendothelial system which clears unopsonized bacteria, serves as a reservoir of mononuclear cells and participates in production of antibodies following exposure to various antigens, loss of this immune function of the spleen either due to surgical removal or functional defect put the patient at a risk to develop overwhelming sepsis, but splenectomy is still performed due to different indications including medical as well as surgical ones. Complication of splenectomy as surgery include: hemorrhage, thrombocytosis and deep vein thrombosis. Aim of this study was to determine indications and complications of splenectomy in Kosti teaching hospital, White Nile State, Sudan.

**Patients and Methods:** In this retrospective study; case notes of all patients who underwent splenectomy at the department of surgery, Kosti Teaching Hospital over the 7-year period (2007-2014) were retrieved and reviewed. The demographic data, the indication of splenectomy; intra operative and post operative complications and mortality were particularly noted.

**Results:** Fifty one patients underwent splenectomy, 31(60.78%) were males and 20(39.22%) were females. The mean age of the patients was 30.31. Indications for splenectomy include: trauma 26(50.98%), hypersplenism as a complication of schistosomiasis 19(37.26%), hematologic disorders 2(3.92%), complication of malaria 2(3.92%), rupture of splenic artery aneurism 1(1.96%) and torsion of wandering spleen 1(1.96%). Complication occurred in 7(13.73%) of patients most of them are among the group of hypersplenism due to schistosomiasis. Mortality rate is 3.92%.

**Conclusion:** The most common indication for splenectomy in our series is trauma followed by hypersplenism due to schistosomiasis. Complications occurred include: intraoperative bleeding, post operative bleeding, post splenectomy sepsis, adhesive intestinal obstruction and incisional hernia.

**Keywords:** Splenectomy; Hypersplenism; Splenic Artery Aneurism; Wandering Spleen

## Introduction

The spleen is an encapsulated hematopoietic organ that lies within the posterior aspect of the left upper quadrant in the peritoneal cavity. It has proximity to the 9th, 10th, and 11th ribs; left kidney; stomach; transverse and descending colon; left hemidiaphragm; and the pancreas. Spleen is a part of reticuloendothelial system

which clears unopsonized bacteria, serves as a reservoir of mononuclear cells and participates in production of antibodies following exposure to various antigens [1,2]; loss of this immune function of the spleen either due to surgical removal or functional defect put the patient at a risk to develop overwhelming sepsis [3]; but splenectomy is still performed, since it was first time performed in 1849, due to different indications including medical as well as surgical ones [4,5], these indications of splenectomy can be further classified into absolute indications and relative indications

[6]; absolute indications include: splenic rupture, tropical splenomegaly, splenic abscess, splenic cysts, neoplasms, angioma and rarely aneurysm of splenic artery [6-8]; for the relative indications of splenectomy hematologic disorders come first [6,9] which include: haemolytic anaemias, haematological malignancy, thrombocytopaenic disorders mainly chronic ITP and some parasitic diseases [9]. Complication of splenectomy include: haemorrhage, thrombocytosis, deep vein thrombosis and overwhelming postoperative infection [6]; to guarantee specifically against overwhelming postoperative infection all patients should receive pneumococcal vaccination haemophilus influenzae type b conjugate vaccine and meningococcal conjugate vaccine at least 2 weeks before splenectomy [10]; those patients also recommended to receive antimalaria in endemic areas [11]. Aim of this study was to determine indications and complications of splenectomy in Kosti teaching hospital, White Nile State, Sudan.

**Patients and Methods**

The case notes of all patients who underwent splenectomy at the department of surgery, Kosti Teaching Hospital over the 7-year period (2007-2014) were retrieved and reviewed. Kosti is the capital of White Nile State which now is the southern part of Sudan after separation of South Sudan in 2011. The demographic data, the indication for splenectomy, intra operative and post operative complications and mortality were particularly noted. The spleen was approached via an upper midline or a left subcostal incision. None of the patients underwent laparoscopic splenectomy. All patients received broad spectrum antibiotics at induction and postoperatively and also received anti malaria postoperatively because malaria is endemic in study area. No patient was given vaccine prophylaxis against pneumococcal infection because it is not available. All the patients discharged on antibiotic prophylaxis based on penicillin and on two tablets of fansidar weekly as a prophylaxis against malaria. Patients were followed initially on monthly basis for three months and then every six months. They were checked clinically and complete blood count done for every patient and the preoperative hematological values were compared to the values at the end of the first and third postoperative months.

**Results**

Fifty one patients underwent splenectomy, 31(60.78%) were males and 20(39.22%) were females. The mean age of the patients was 30.31. Indications of splenectomy in the studied group are shown in (Table 1). Seven (13.73%) patients developed complications which are detailed in (Table 2). Two (3.92%) patients died, one patient was female with portal hypertension died due to post splenectomy sepsis and the other was intraoperative

death, in a female also with portal hypertension, due to intractable intraoperative bleeding.

Indication for splenectomy	No of patients	%
Trauma	26	50.98
Hyersplenism due to bilharzial portal hypertension	19	37.26
Hematological indications	2	3.92
Spontaneous rupture of spleen due malaria	2	3.92
Rupture of splenic artery aneurism	1	1.96
Torsion of wandering spleen	1	1.96
Total	51	100

**Table 1:** Indications of Splenectomy.

Indications of splenectomy	No of complications	Type of Complications
Trauma	1	Post splenectomy sepsis
Portal hypertension	5	1-Adhesive intestinal obstruction 2- Incisional hernia (2 patients) 3-Post splenectomy sepsis 4-intraoperative bleeding
Hematologic disorders	1	post operative bleeding
Spontaneous rupture of spleen due to malaria	0	No complication
Rupture of splenic artery aneurism	0	No complication
Torsion of wandering spleen	0	No complication

**Table 2:** Complications of splenectomy per indication.

**Discussion**

In this study population males are predominant as reported by other studies [2,12]. The mean age of the patients in this study is 30.31±SD in consistent with Deodhar report [12]. The main indication for splenectomy in our study was trauma (50.98%) (Table 1) which was also described as first indication

for splenectomy in different reports [13,14], only one patient among this group (26 patients) developed post splenectomy sepsis which was the only complication occurred among those patients; post splenectomy sepsis is a common complication following splenectomy [15] specially in patients in whom splenectomy is indicated because of trauma [13,14,16,17] and because of this the general attitude concerning splenectomy for trauma is recently tilted towards preserving the spleen either through spleen-sparing surgical approaches, like partial splenectomy, splenorraphia, use of biological glue or splenic encasement; or through nonoperative management of spleen involved in trauma [18-20] but the decision of nonoperative management for splenic trauma should be taken carefully and depend not only on hemodynamic stability of the patients, in spite of its importance, but also should consider other factors including: absence of peritoneal signs or any associated injuries necessitating laparotomy, presence of multiple injuries, high-grade splenic injury, a large haemoperitoneum, age and high Injury Severity Score (ISS) because those factors are reported as risk factors for failure of nonoperative management [21-23].

The second major indication for splenectomy in our study is hypersplenism as a consequence of portal hypertension (37.26%) secondary to schistosomiasis, a disease which is endemic in Sudan particularly in White Nile State [24,25] where we conducted our study. Among the nineteen patients with hypersplenism and portal hypertension five patients (26.3%) developed complications which include: intraoperative bleeding, post splenectomy sepsis, adhesive intestinal obstruction and incisional hernia (Table 2). Two patients died in this group, which represents a total mortality rate of (3.92%) for the (51) studied patients; one patient died due to intractable intraoperative bleeding and the other patient's cause of death was post splenectomy sepsis. One more spleen was removed because of hypersplenism in a patient with thalassemia, this patient developed post operative bleeding (Table 2).

The other hematologic disorder which indicated splenectomy in our series is immune thrombocytopenic purpura (ITP) which is a common indication for splenectomy [5,6,26] and splenectomy remains one of the second line options for treatment of this condition [27-29] for patients who relapsed after the first line treatment or refractory to it. First line treatment of ITP include corticosteroids, Anti-D and IVIG while the second line treatment include thrombopoietin receptor agonists (TRAs) such as eltrombopag, avatrombopag and romiplostim as well as chimeric monoclonal antibody rituximab and more recently the spleen tyrosine kinase (Syk) inhibitor fostamatinib, [30-33], with the introduction of these new second line treatments and in the face of complications that might accompanying splenectomy which may range from poor response to surgical mortality [34,35] splenectomy for ITP is slowed down but not vanished of course [33,36,37]. Spontaneous rupture of the spleen was indication of splenectomy in tow of our patients (Table 1); the etiology behind

splenic rupture in those patients was falciparum malaria; another parasitic disease which is endemic in Sudan especially White Nile state [38-40], area of our study; the most prevalent species in this area is plasmodium falciparum [40] which causes severe disease and complications among them is rupture of the spleen which is not confined to falciparum malaria and may complicate malaria caused by other species as well [41-43] with an estimated incidence of 2% in some reports [44]. About 252 cases of ruptured spleen reported in Sudan were associated with malaria [45]. Splenectomy and nonoperative management for ruptured spleen due to malaria are both in practice and again the hemodynamic stability of the patient is the major factor among others that will determine the decision of which mode of treatment will be taken [42-47] and even when splenectomy is chosen surgical complications are rarely reported [42,44,47]. Our two patients were hemodynamic instable so splenectomy was the treatment of choice and the procedure went without complications in both of them (Table 2).

One patient in our series was subjected to splenectomy because of rupture of splenic artery aneurysm (Table 1). Splenic artery aneurysm (SAA) is a rare but potentially life threatening condition, almost all visceral artery aneurysms occur in splenic artery and splenic artery aneurysm comes third only to aorta and the iliac artery aneurysms in the abdomen; splenic artery aneurysm is common in women and prone to rupture when diameter exceeds 2 cm [48-52]. Rupture of splenic artery aneurysm is commonly occur during pregnancy and puerperium [53-57] with the third trimester being the commonest time for rupture of SAA [58] especially the last two weeks of pregnancy. Factors thought to be contributors in development of SAA and its rupture during pregnancy include increase splanchnic and splenic arterial blood flow due to pregnant uterus by compression of the aorta and iliac vessels, and alterations of the arterial wall structures, induced by hormonal modifications [59]. Our patient was scheduled for caesarean section at 37 week gestational age, the c/section was planned because of pure obstetric indication and the pregnancy course was normal without any event; the procedure went normally and a viable baby was delivered but after closing the uterus intraperitoneal bleeding was observed which first was thought to come from the uterus but tracing demonstrated a ruptured splenic artery aneurysm and splenectomy was performed, patient received transfusion intra operative and recovered smoothly. The final spleen in our series was removed because of torsion of wandering spleen (Table 1); we reported this case which was 10 year old girl who was presented to the emergency department with severe central abdominal pain and a firm, rounded, tender and freely mobile central abdominal mass. Ultrasonography revealed absence of the spleen in its usual site, and a hypo-echoic mobile mass in the mid abdomen. The patient underwent laparotomy in which we found mobile, infarcted spleen which lacked ligamentous attachment with torsion in long splenic pedicle. The splenectomy was done after detorsion of the pedicle, she was discharged in good condition [60].

In conclusion we reported 51 patients whom underwent splenectomy, in all of them the procedure was performed through laparotomy. Indications for splenectomy include :trauma, hypersplenism as a complication of schistosomiasis,hematologic disorders,complication of malaria, rupture of splenic artery aneurism and torsion of wandering spleen. Complication occurred in 7(13.73%) of patients most of them are among the group of hypersplenism as a complication of schistosomiasis. Mortality rate is 3.92%.

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