

Abdominal War Wounds With Large Bowel Involvement: The Medina Hospital Experience

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Background: Medina Hospital, a Police Hospital in Mogadishu South, Somalia was closed after the civil war broke out in 1991. With the support of the International Committee of the Red Cross (ICRC), was reopened as community based hospital in 2000. The authors present their experience in the treatment of penetrating abdominal war wounds involving the colon in Medina Hospital.

Methods: A retrospective descriptive study of civilian and military casualties with penetrating abdominal war injuries involving the colon, treated in Medina Hospital from June 2000 to June 2002 was undertaken.

Results: A total of 3496 war wounded patients were treated in Medina Hospital during the period under review. Among them 950 presented with penetrating abdominal war wounds, with large bowel involvement in 430 of them. Initially, 237 (55%) cases of large bowel injury were treated with colostomy; 193 had primary colon closure without any significant increase in the complication rate.

Conclusion: In war situations colostomy may be avoided by performing primary repair of the penetrating large bowel gunshot wounds.

Introduction

Abdominal war wounds account for about 10% of the injured in conventional warfare¹. Due to the great improvements in medical science during the past century, mortality related to abdominal war injuries has declined from more than 75% during World War I to 12% in the Iran-Iraq War². The choice of treatment of penetrating abdominal war wounds involving the colon lies between primary repair and deviation of the faecal stream.

In World War II and Vietnam War, colostomy was considered mandatory in penetrating large bowel war injuries. Civilian experience with gunshot wounds, better understanding of physiology and pathology,

a wider availability of powerful antibiotics have all tended to favour a conservative approach, increasing the number of cases treated with primary repair. However, what is true in a peaceful situation, may not always be the case in contemporary war practice where many constraints such as lack of water and electricity, shortage of drugs and dressing material, sudden large influx of war wounded and patients with multiple injuries (involving the chest, abdomen, limbs) resulting in lack of time for a definitive treatment, delay from injury to treatment, but, most important of all, lack of surgical skills by the medical staff involved in surgical management work against this approach.

Medina Hospital was a Police Hospital in South Mogadishu, Somalia. In 1991 it was closed when the civil war broke out in the country. With the support of the International Committee of the Red Cross (ICRC), it was reopened as a community based hospital in 2000. The ICRC surgical plan included rehabilitation of the hospital buildings, provision of medical and surgical material as well as human resources, training of the local staff in hospital management, laboratory technology, patient triage and nursing, and war and general surgical skills. One surgeon and one anaesthetist constituted the expatriate surgical team which provided patient surgical care and "on the job training" to six "local surgeons" who were young doctors, most of whom graduated from Mogadishu, Somalia before the civil war started and had previously learnt some surgery on their own.

Admission criteria included any surgical emergency with priority to war wounded patients. Due to the fact that most of the war conflicts happened around or inside Mogadishu town, the interval between the time of injury and admission and treatment was often under 2 hours. As a result, the hospital received and treated a large number of serious cases with "central" injuries, involving the brain, chest and abdomen. This paper describes our experience in management of penetrating war large bowel trauma from June 2000 and June 2002.

Patients and Methods

A 2 years retrospective descriptive study of civilian and military casualties, with penetrating abdominal war injuries involving the colon, treated in Medina Hospital From June 2000 to June 2002, 3496 war wounded patients were admitted of which 950 had penetrating abdominal wounds with large bowel involvements in 430 of them. Those with rectal injury below peritoneal reflection or anal injury were excluded from the present study since they automatically required a colostomy.

Nearly 90% of these patients were able to reach the hospital within two hours after the injury. Upon arrival at the hospital, all patients were resuscitated and stabilized with intravenous fluids and/or blood transfusions. Haemoglobin, haematocrit tests and blood grouping were done. Anti-tetanus serum, tetanus toxoid and antibiotics were administered. Following the ICRC protocol on antibiotic therapy, the patients received benzyl penicillin 5 M IV 6 hourly plus metronidazole 500 mg IV 8 hourly plus 8-hourly 80 mg intravenous gentamycin, all for 5 days. A nasogastric tube and bladder catheter were inserted.

A general anesthesia with ketamine and with endotracheal intubation and muscle relaxation (suxamethonium) was used.

A midline incision approach, extending from the xiphoid to the pubic symphysis, was routinely used as this provided the best exposure for intraperitoneal organs exploration. After controlling the bleeding, a systematic exploration of the abdominal cavity was performed to estimate the extent and type of damage. Organ injuries were assessed and appropriately managed. Colonic wounds were either primarily repaired, exteriorized as loop colostomy, repaired and protected by loop colostomy, treated with resection, end colostomy and mucous fistula or Hartmann procedure.

Colon repair or anastomosis was performed with a double layer of vicryl 2/0 (first layer interrupted and second running stitches). The peritoneal cavity was then irrigated with large quantities of warm saline. Abdominal drains were not routinely used. For the closure of abdominal wall, the parietal peritoneum layer was not repaired. Fascia was closed with a number 1 vicryl running suture. In case of generalized peritonitis the fascia was closed with interrupted sutures. Skin was closed with either interrupted polypropylene stitches or was left open, depending on the degree of contamination (ICRC suggestion) and closed after 5 days if clean. The entry and exit wounds were debrided and left open, to be closed after 5 days if clean according to ICRC protocol. At the end of the operation, anal stretching was performed in all the cases submitted to primary repair to reduce the colon intraluminal pressure.

During a first phase, related to the learning curve of the local surgeons, all colon injuries were treated with colostomy, irrespective of the situation. Once their experience and technical skills improved, primary colon repair has also been considered, depending on the specific situation. As a result 193 cases (45%) have been treated with primary closure while 237 (55%) received a colostomy. Patients treated with colostomy remained admitted in the hospital till colostomy closure, due to lack of sufficient care in case of discharge. The colostomy was routinely closed after 3 weeks unless there were complications.

Results

Between June 2000 to June 2002, 430 patients with penetrating abdominal war wounds involving the colon were admitted at Medina Hospital. The patients' ages ranged between 9 and 60 years with a mean of 25 years.

There were 341 adult males and 85 adult females. Four patients were children aged less than 12 years. The time interval from the time of injury to treatment ranged from 1 to 72 hours with a mean of 2 hours.

The transverse and left colon were injured in 57% of the cases, the caecum and right colon in 41% and mixed in 2%. Associated injuries included penetrating

chest injuries in 26, head injuries in 5, and limb wounds in 29 cases. Of the 430 cases, 237 were managed with colostomies while 193 had primary repair of the large bowel.

The hospital stay in patients with primary repair ranged from 8 to 52 days with a mean of 17 days. For those who had a colostomy the hospital stay

Table 1. Post-operative complications.

Complication	Colostomy (N=237)		Primary Closure (N=193)	
	No. Of Pts	%	No. Of Pts	%
^o Fistula	18	7.6	14	7.2
Bowel obstruction	5	2.1	7	3.6
Peritonitis	4	1.7	10	5.2
Burst abdomen	7	2.9	2	1.0
*Others	7	2.9	8	4.1
**Deaths	61	25.7	31	16.1

^o The cases of fistulization in the colostomy group were all related to a colostomy closure Complication.

Other complications include post-operative biliary leak, bleeding, unrecognized ureteric injury, Etc, all requiring re-laparotomy.

**Most of the patients died within 48 hours after admission due to multiple injuries and prolonged shock.

Discussion

The management of penetrating colon injuries has been, and still is, a controversial subject. The first guidelines regarding the management of colon trauma were published in 1943 by the U.S. Surgeon General and mandated exteriorization or proximal diversion for all colon injuries³. Shortly thereafter Ogilvie⁴ reported dramatically reduced mortality with exteriorization or diversion of colon injuries sustained during the North African campaign, as compared with the results after suture repair performed during World War I.

This policy of mandatory colostomy remained in fashion till the late 70s. The first who tried to go against this "dogma" were Stone and Fabian⁵ who, in 1979, presented their landmark, prospective, randomized study comparing primary repair with diverting colostomy. By treating with primary repair 52% of penetrating colon injuries in their patients group, they showed that in selected cases primary repair was associated with fewer complications than colostomy. After them, several studies have been published examining in more detail the role of several risk factors like delay from injury, degree of peritoneal contamination, blood loss and number of transfusions, hypotension, extent of the colon injury, injury on left colon versus right colon, combined injuries etc^{6,7,8}.

Demetriades et al⁶, in their prospective multicentre study concluded that "the method of colon management does not influence the incidence of colon-related abdominal complications, irrespective of the presence or absence of any risk factors." Furthermore Nance and Nance⁹ stated that " a surgeon using colostomy in the management of penetrating colon injury should be required to justify the continuation of this obsolete and discredited practice". If this is the trend in the civilian practice, the situation is not the same under war conditions due to the many constraints the war surgeon has to face: sudden large influx

of wounded, shortage of antibiotics and dressing material etc, lack of water and electricity. But probably the most important aspect affecting the decision for primary repair or colostomy is the experience of the surgeon.

Moreover most of the reports on the management of penetrating colon wounds, gunshot related, coming from the civilian practice, are the result of low speed and low energy bullets (handguns) causing small wounds. The situation is different when dealing with war rifles shooting high energy bullets. These can cause high energy transfer resulting in cavitations and huge disruption of the tissues.

In our opinion, in contemporary war practice, primary colon repair and colostomy should both be

considered, depending on the particular situation.

Our retrospective study is not complete as we are missing the statistical analysis on the data due to lack of experience in this field. The higher rate of complications in the colostomy group in our series is most probably related to the learning curve of local surgeons. Primary repair, as an alternative for colon repair, was only introduced when the level of experience and technical skills was judged satisfactory by ICRC surgeons. This also explains, in our opinion, the 18 cases of fistulization and the higher rate of deaths in the colostomy group. Besides, colostomy repair was often preferred in case of patients with multiple injuries and bad general conditions as reducing the operation time.

Conclusions

While in civilian practice there seem to be a trend towards avoiding colostomy in most cases dealing with penetrating colon gunshot wound, in contemporary war situations both colostomy and primary repair still play an important role.

In our opinion, the factors influencing the decision for the operative procedure are as follows:

- Experience of the surgeon (probably the most important).
- Delay from injury. Degree of fecal contamination.
- Size and type of injury, related to terminal ballistics.
- Age and general conditions of the patient (nutritional status) and
- Number of abdominal organs injured.

Our findings suggest that in even in the war situation, it is possible to perform primary repair of the large bowel in experienced hands.

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