

Treatment of gunshot wounds to the colon: experience in a rural hospital during the civil war in Somalia



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Introduction

The surgical treatment of gunshot wounds to the colon has changed considerably over the years. During World War I the standard approach was primary repair, which was associated with a mortality rate of 65-75%, mainly due to secondary sepsis. During World War II, thanks especially to the experience of the surgeon W. Ogilvie (1) during the British campaign in Africa, the principle became established that all penetrating colon injuries had to be treated by diversion of the involved segment. Due to the ensuing radical decrease in mortality and complications, colostomy was adopted in the years that followed as the treatment of choice also in civilian practice. In recent years the surgeon's attitude towards such injuries has changed again, and the current trend is towards a progressive reduction of colostomies. On the basis of our experience including 24 cases of colonic gunshot wounds treated at the hospital of Jowar during the civil war in Somalia, we have a number of observations to report, in particular with regard to the treatment of destructive colon injuries, whether or not associated with risk factors.

Material and Methods

Our series included 24 patients with gunshot wounds to the colon treated at the hospital of Jowar in the Middle Shebelle region of Somalia between 1999 and 2001. We excluded from the present study rectal injuries below the

Riassunto

IL TRATTAMENTO DELLE FERITE DA ARMA DA FUOCO DEL COLON: ESPERIENZA IN UN OSPEDALE RURALE DURANTE LA GUERRA CIVILE IN SOMALIA

Negli ultimi anni si è osservato, nella pratica chirurgica civile, un trend caratterizzato dalla diffusione della riparazione diretta delle lesioni da arma da fuoco del colon, con un decremento delle colostomie realizzate.

La nostra casistica comprende 24 pazienti trattati per ferite da arma da fuoco del colon presso l'Ospedale di Jowar - Somalia - durante la guerra civile.

In 18 pazienti è stata eseguita una resezione con anastomosi immediata, mentre in 6 pazienti è stata confezionata una colostomia (5 colostomie su bacchetta, 1 colostomia terminale). La mortalità complessiva osservata è stata del 25% (6/24). I dati clinici relativi ai casi trattati sono riassunti nella Tab. I.

Riteniamo che soprattutto in situazioni ambientali "difficili", l'applicazione sistematica di linee guida non sia sempre realizzabile. Le decisioni prese al tavolo operatorio sono complesse e legate a valutazioni spesso soggettive che tengano conto del contesto ambientale e culturale, della gravità delle lesioni e dell'esperienza del chirurgo.

Parole chiave: Lesioni da arma da fuoco del colon, colostomia.

Abstract

Background: In the last few decades there has been a clear tendency in civilian practice towards primary repair of gunshot wounds to the colon, resulting in a substantial decrease in the number of colostomies performed for this type of injury.

Methods: The series described here comprises 24 patients with gunshot wounds to the colon treated at the hospital of Jowar in the Middle Shebelle region of Somalia between 1999 and 2001. All injuries were caused by war arms firing high-velocity projectiles.

Results: In 18 patients surgery consisted of resection and immediate anastomosis, while in the remaining six patients colostomies were performed including five loop colostomies and one terminal colostomy. The sepsis-related mortality was 25% (6/24).

Conclusion: Our experience had a peculiar setting, namely that of a civil war in a developing country. In this kind

of "difficult" situation there probably exists no ideal procedure and the decisions taken at the operating table are influenced by various factors that are often related to subjective assessment.

Key words: Colon injury, colostomy, primary repair.

peritoneal reflection (two patients treated with colostomy and closure of the rectal stump who died of destructive pelvic injury).

The patients included in the study were 22 men and two women ranging in age between 18 and 49 years. The interval between the event causing the injury and clinical observation was less than six hours in only eight cases, while in six cases it was more than 24 hours. From the moment of initial clinical assessment, vital signs were monitored in all patients. All patients received a nasogastric tube and bladder catheter and underwent rectal examination. Abdominal x-ray was performed in 20 patients, showing the presence of intraperitoneal air in all cases and radio-opaque fragments in seven. At the time of admission six patients were in shock (systolic pressure <80 mmHg). The number of blood transfusions was limited by the scarcity of blood and blood products. Only patients with severe hypotension received three to six bags of full blood. Following initial assessment all patients were given 3,000,000 IU penicillin G benzathine t.i.d. and i.v. metronidazole (25 mg/kg/day, in three administrations).

Results

All patients underwent a supraumbilical-pubic exploratory laparotomy under anesthesia with i.v. ketamine hydrochloride. This drug was used because of its favorable clinical characteristics (easy use, relative safety, ability to raise the blood pressure) and because it was easy to obtain. The site of the injury was the right colon in 13 cases,

the left colon in nine cases and the transverse colon in two cases. Concurrent injuries to the abdomen were present in five cases (5/24 = 20.8%): four in the small bowel and one involving the right ureter. One patient had a chest injury with hemopneumothorax; another patient had an extensive retroperitoneal hematoma caused by contusion of the inferior vena cava.

With reference to the Colon Injury Scale (CIS) (2, 3, 4), the severity of the colon injuries observed at surgery can be summarized as mild to moderate in 9 cases (CIS I and II), severe injuries involving >50% of the colon wall in nine cases (CIS III), tissue loss in five cases (CIS IV), and compromised vascularization of a colonic segment in one case (CIS V).

In 18 patients (18/24 = 75%) surgery consisted of resection and immediate anastomosis. The procedures included seven right hemicolectomies, nine wedge resections (five involving the right and three involving the left colon) and two segmentectomies involving the transverse colon. All the anastomoses were performed manually with interrupted linen (or Mersilene, if available) sutures, with a second layer for reinforcement.

In five cases surgery consisted of a loop colostomy with the use of an ostomy rod; in one case this involved direct exteriorization of a destructive sigmoid injury while in four cases protective colostomies were performed following segmental resections of the left colon. In the last patient we performed a terminal colostomy after segmental resection of the sigmoid with closure of the distal stump. Concurrent injuries to the small intestine were repaired by segmental resection and manual E-E anastomosis, while the right ureteral injury (associated with a descending colon wound) was repaired by means of a second operation in which the appendix was used, after adequate mobilization of the right colon. The hemopneumothorax was managed by insertion of a thoracic drain. The overall sepsis-related mortality was 25% (6/24 cases). The data related to the clinical cases are summarized in Tab. I.

Tab. I – CLINICAL CASE SERIES

<i>Grade of injury (CIS)</i>	<i>Site of injury</i>	<i>Type of surgery</i>	<i>Deaths</i>
CIS I and II	9 Right colon	6 Wedge resection (6)	1
	Left colon	3 Wedge resection (3)	0
CIS III	8 Right colon	3 Right hemicolectomy (3)	0
	Transverse colon	2 Segmental resection (2)	0
	Left colon	4 Segmental resection with protective colostomy (4)	2
CIS IV	5 Right colon	4 Right hemicolectomy (1)	1
	Left colon	1 Loop colostomy with exteriorization of the injury (1)	1
CIS V	1 Left colon	1 Segmental resection with end colostomy and closure of the distal stump (1)	1

Discussion

The literature on this subject is abundant but controversial and reflects the different experiences of the authors, which are often contradictory in terms of the availability of resources, environmental conditions, and objectives.

Starting from the 1980s there has been an increasing tendency, at least in civilian surgery, towards primary repair of colon injuries. The reason for this was that in a large number of reports by various authors (5-12) mention was made of a considerable decrease in septic complications and mortality compared to cases treated by colostomy, independent of the presence of risk factors at the time of surgery. In particular the results of three prospective randomized trials published in the last decade (13, 14, 15, 16), in which the different surgical options were compared, were highly significant in this respect. The tendency towards the increased use of primary repair was confirmed by the results of a survey among the members of the American Association for the Surgery of Trauma (AAST): the only injury for which most surgeons would still perform a colostomy was high-velocity gunshot wounds (17). However, the literature is not without discordant opinions about "exceedingly optimistic conclusions that disregard the technical difficulties associated with severe injury" (18). In other words, although the basic issue of the discussion has been completely reversed with respect to the past, the fundamental question, when is primary repair *not* indicated, remains unresolved.

We consider it appropriate to take on an attitude that does not exclude *a priori* any of the possible surgical options: the treatment choice cannot ignore the environmental circumstances, possible risk factors present at the time of surgery, and the experience of the surgeon. Examples of how environmental circumstances may influence treatment decisions are operations performed in war situations (large number of patients to be treated contemporaneously, peculiar features of war arms) or, as in our experience, in developing countries (poorly equipped operating rooms, lack of resources and of personnel able to deal with major surgery).

In our opinion the most important risk factors are the number of injuries and their severity, the extent of fecal contamination, the presence of concurrent injuries to other organs, and the presence of shock.

We treated minor injuries (CIS I and II) with a wedge resection up to the antimesenteric border of the colon, followed by anastomosis.

We believe that colostomy is still the procedure of choice when there is extensive fecal contamination or when the patient is in poor general condition, because the main priority in these cases is to keep the procedure as short as possible and guarantee the survival of the patient. In the series described here we performed six colostomies: four protective colostomies after resection +

anastomosis (CIS III), one loop colostomy with exteriorization of the injury (CIS IV), and one terminal colostomy following segmental resection with closure of the distal stump.

In all other cases the performed procedures were colon resections with immediate anastomosis: the extension of the resection was determined by the number of injuries and their severity and by the necessity to guarantee adequate perfusion of both ends of the anastomosis.

In conclusion, we would like to underline two important aspects that emerged from our experience:

– The devascularized portion of the colon is generally larger than it would seem at intraoperative assessment. Although apparently undamaged, due to the peculiar mechanism of projectiles fired from modern weapons the perilesional tissue is often contused and devitalized. It may therefore be necessary to perform a more extensive resection in order to guarantee adhesion of the sutures and avoid the risk of delayed stenosis.

– Especially in "difficult" environmental settings that are culturally different from our everyday experience, systematic application of predefined guidelines is not always feasible. Consequently, we believe that the ideal procedure does not exist, in that the decisions taken at the operating table are complex and depend on many different factors which are often related to subjective evaluation.

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Commento

Commentary

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Il lavoro clinico-statistico di Angelici e collaboratori, riferito alla loro attività presso l'ospedale di Jowar in somalia, conferma la validità di un'inversione di tendenza ormai in atto nella terapia delle lesioni traumatiche del colon. Come accennato dagli stessi Autori, a decorrere dall'ultimo conflitto mondiale, quando la colonstomia derivativa rappresentava il gold-standard in questo settore della patologia, l'orientamento terapeutico progressivamente virato a favore del ripristino immediato della continuità intestinale.

Considerando che la maggior causa di complicanze, nel post-operatorio di questa patologia, è rappresentato dall'infezione e dalla deiscenza dell'anastomosi colo-colica, è facile desumere che le migliorate capacità di supporto clinico a questo tipo di pazienti rende ragione dei nuovi orientamenti terapeutici. Fanno bene gli autori a sottolineare che, in questo settore, qualora (come spesso accade) ci si trovi ad operare in condizioni ambientali particolarmente disagiate, per di più su pazienti traumatizzati già da diverse ore, a nulla valgono gli orientamenti ufficiali rispetto all'indiscutibile e sovrano criterio della valutazione personale dell'operatore.

The clinicostatistical study conducted by Angelici and his colleagues referring to their activity inside the Somali Jowar Hospital, confirms the reversing tendency that nowadays is characterising the therapy of colon's traumatic lesions.

As the Authors said, since the last World War when the derivative colonostomy represented the "gold standard" as treatment of these particular lesions, the therapeutic trend has progressively turned in favour of the immediate restoring of bowel's continuity.

If we consider that the most important cause of the postoperative sequelae is represented by the infection and the deiscence of the colo-colic anastomosis, it is very easy to deduce that the improved capacities to provide a clinical support to this kind of patients justify the new therapeutic propensity.

The Authors are right to stress that in this particular field, if the environmental conditions are needy and the patients have been traumatized for several hours, the official protocols become less adequate than surgeon's personal valuation.

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