Original Article

Comparing the results penetrating colon injuries based on intervention by surgeons with different levels of experience in West Indies

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ABSTRACT

Background: Numerous studies have established the safety of primary repair for civilian penetrating colonic injuries with little data exploring the experience of surgeon performing the procedure. Owing to financial, staff and administrative constraints in the developing world, surgeons-in-training sometimes find themselves faced with having to perform major surgery for penetrating colonic injuries with no experienced surgeon in attendance, but available for advice via phone. With this thought, we collected retrospective data to analyse our outcomes based on this practice. **Materials and Methods:** Over a 10-year period 62 patients with penetrating colonic trauma underwent laparotomies with analysis done on 53 cases. Severity of injury, grade of operating surgical staff and outcome were noted. Outcomes of "inexperienced surgeons" and "experienced surgeons" were compared to determine if a difference exists in outcome based on experience or grade of surgeon. **Results:** A total of 53 patients with penetrating colon injures underwent primary repair and/or anastomosis with 18 (34%) performed by "inexperienced surgeons" and 35 (66%) by "experienced surgeons". There was one death unrelated to colon trauma with an "inexperienced surgeon" and one anastomotic leak in a patient operated on by an "experienced surgeon". **Conclusion:** This data supports previous reports on the safety of primary repair for penetrating colonic injuries and raises the point that in cases of lower severity of injury inexperienced surgeons have similar results to experienced surgeons with regard to primary repair.

Key Words: Colon injury, penetrating colon injury, primary repair

INTRODUCTION

Primary repair of colonic injury has been a topic of controversy for many decades starting in the World War II period. Numerous studies have established the safety of primary repair for civilian penetrating colonic injuries,[1,2] but there is little data exploring the required experience of the surgeon performing the procedure.

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The aim of this paper is to compare the outcomes of primary repair and/or anastomosis done by "inexperienced surgeons" and those done by "experienced surgeons" for penetrating colonic trauma for a 10-year period at the General Hospital, Port-of-Spain, Trinidad and Tobago, West Indies.

MATERIALS AND METHODS

Over a 10-year period, 62 patients with penetrating colonic trauma were seen at the General Hospital, Port-of-Spain, Trinidad and Tobago. Severity of injury, grade of operating surgical staff and outcomes were noted.

Surgical experience was classified as follows: "inexperienced surgeons" were those who were practising in General Surgery under supervision for a period of 4 years with the facility to seek advice via phone from an established Consultant Surgeon whereas "experienced surgeons" were those holding a postgraduate degree in surgery and/or practising in General Surgery for more than 4 years.

Primary repair or resection and anastomosis of the injured bowel wall was done using an inverting two-layer technique with 2/0 chromic catgut sutures. At the time the cases were performed (1990-2000) chromic catgut was accepted for use and was the most common suture used at that time at our institution for suturing of bowel.

Intraoperative colonic irrigation was not performed in any of the cases. However, peritoneal lavage was performed in 12 patients due to preference of operating surgeon. In all cases, perioperative broad-spectrum antibiotics were used. A comparison of the results of the two groups was done and shown in Table 1.

RESULTS

Operative records revealed a total of 62 cases with penetrating colonic trauma. Four were excluded due to difficulty in retrieving data, leaving 58 cases for analysis. A further five patients who sustained gunshot wounds to extraperitoneal region of the recto-sigmoid area and had a colostomy were excluded leaving 53 cases for analysis.

Gunshot injuries accounted for 40 (75.5%) and stab injuries for 13 (24.5%). The age range was 16-84 with a mean of 31 and the majority of patients (48) were male. All 53 patients underwent primary repair and/or anastomosis of the colonic injuries without colostomy. Details of the severity of the colon injury, associated injuries and complications where primary repair or primary anastomosis was performed are illustrated in Table 1. Colon injury was assessed using a colon injury score, which is classified according to Table 2. Eighteen cases were performed by "inexperienced surgeons" and 35 cases by "experienced surgeons". Of the 18 cases done by "inexperienced surgeons" eight were stab and 10 were gunshot wounds. Debridement of the bowel edges was unnecessary in most cases.

Table 1: Details of 53 cases consisting of 18 juniors and 35 seniors who underwent primary anastomosis

Variable	Junior surgeon (*n*=18)	Senior surgeon (*n*=35)
Colon injury score	Range 1-3 (mean=2.25)	Range 2-5 (mean=3.1)
Operative findings		
Vascular damage	0	2
Small bowel damage	2	12
Mild faecal contamination	18	20
Severe faecal contamination	0	7
ICU	0	1
Transfusion	0	6
Wound infection	2	8
Hospital stay	Range 3-8 days (mean=6.25)	Range 5-20 days (mean=7.9)
Site of colon injury		
Transverse	12	21
Ascending	2	7
Descending	1	7
Sigmoid	0	0
Anastomotic/ primary repair leak rate	0	1

Table 2: Colon injury score to classify severity of colon injury

Colon injury score
Contusion/laceration to mucosa
Laceration <50% circumference
Laceration >50% circumference
Complete transection
Segmental tissue loss/destruction

There was one mortality occurring in a 24-year-old male with gunshot injuries to the transverse and ascending colon associated with massive injuries to the liver. Hemorrhage was profuse and the patient died intraoperatively from shock. This occurred with an "inexperienced surgeon" operating.

There was one major morbidity which occurred in a 24-year-old female with gunshot injuries to the descending colon. Resection and primary anastomosis was done by an "experienced surgeon" with a resulting leak. A relaparotomy and defunctioning transverse colostomy was performed and the patient was admitted to intensive care unit where she recovered. The total hospital stay was 20 days and a superficial wound infection occurred.

The colon injury scores were comparable for 80% of the cases; however, approximately 20% of cases performed by "experienced surgeons" had higher colon injury scores and severe faecal contamination as well as a higher transfusion rate, wound infection rate, hospital stay and intensive care admission rate [Table 1]. No intra-abdominal abscess or wound dehiscence occurred.

DISCUSSION

Primary repair of colonic injuries has been a topic of controversy for many decades starting in the World War II period where mortality rates approached 100% for wounded soldiers receiving high velocity missile injuries. At that time the Surgeon General of the US army gave orders to exteriorize all colonic wounds, which led to mortality rates dropping to as low as 30%. Following this, the first paper supporting the use of colostomy was by Ogilvie in 1944 with his report on abdominal wounds in the Western Desert. The mandate, that all colonic injuries required colostomy was questioned by Woodhall and Ochsner in 1951 in their paper based on trauma in civilian practice;[3] this included low velocity injuries such as stab wounds. This was supported by Hashmonai in 1983,[4] who highlighted points such as few organ injuries, right-sided injuries, stabs, short-time interval between injury and operation, absence of shock and minimal fecal contamination.

The Landmark paper in 1979 by Stone and Fabien was the first prospective, randomised study comparing primary repair and colostomy in which primary repair was successfully performed in 52% of penetrating colon injuries.[5]

Since then, there have been many reports supporting this practice.[1,2] In 1991, a study was published from our centre demonstrating primary repair or primary anastomosis to be safe with a 93% primary repair and/or anastomosis rate in 61 consecutive cases. There was one anastomotic leak and one unrelated death.[6]

Over the past few years, there have been a few reports from various regions of the globe where the incidence of penetrating colon injury is high and practice is largely based in war or high military action zones. This includes the following: Hussain *et al.,* 2003 in Lahore, Pakistan,[7] Adesanya *et al.*, 2004 in Lagos, Nigeria,[8] Hudolin *et al.*, 2005 in the Croatian war[9] and Kahya *et al.*, 2006 in Turkey.[10] All these articles advocate the use of primary repair or resection and primary anastomosis without colostomy for penetrating colon injuries.

In our present series, the mode, site of injury, presence of hypotension or peritoneal contamination did not affect the decision to perform primary repair or primary anastomosis of the colon with the exception of five extraperitoneal rectosigmoid perforations. This resulted in a primary repair and/or anastomosis rate of 91%. Additionally, 18 cases (34%) were handled by "inexperienced surgeons" and 35 (66%) by "experienced surgeons" with no difference in operative outcome in cases of lower severity. The one death recorded was intraoperative and unrelated to the colon injury and the one primary repair leak was performed by an "experienced surgeon". The colon injury scores were comparable for 80% of the cases; however, approximately 20% of cases performed by "experienced surgeons" had higher colon injury scores and severe faecal contamination as well as a higher transfusion rate, wound infection rate, hospital stay and intensive care admission rate [Table 1]. No intra-abdominal abscess or wound dehiscence occurred.

Case-mix variables and physiologic variables could not be addressed due to the data being collected retrospectively; however, this data supports previous trials in the safety of primary repair for penetrating colonic injuries and highlights the point that in cases of lower severity of injury, "inexperienced surgeons" have similar results to "experienced surgeons" performing cases of similar severity.

Owing to ethical considerations we are aware that such a study cannot be proposed in most countries and we in no way advocate unsupervised training. The practice has largely changed in our country and region with improved resources and a satisfactory level of supervision now being the mainstay of training young surgeons.

In conclusion, this data adds support to the practice of primary repair for penetrating colon injuries and gives a new perspective on outcomes in relation to grade and experience of the operating surgeon.

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