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Original article

Endoscopic and operative treatment of delayed complications after pancreatic trauma: An analysis of 27 civilians treated in an academic Level 1 Trauma Centre

J.E.J. Krige*, U.K. Kotze, P.H. Navsaria, A.J. Nicol

Department of Surgery, University of Cape Town Health Sciences Faculty, Surgical Gastroenterology Unit and Trauma Centre, Groote Schuur Hospital, Observatory, Cape Town, South Africa

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ABSTRACT

Background: This study evaluated the efficacy of endoscopic treatment of delayed local complications including pseudocysts and persistent pancreatic fistulae in a cohort of civilian patients who had previously sustained a pancreatic injury.

Method: A large institutional database was interrogated to identify patients who developed a delayed pancreatic complication among those with pancreatic injuries treated between January 1990 and December 2013. The degree of the pancreatic duct injury was graded using a new duct injury grading system and endoscopic therapeutic outcome assessed according to the grade of injury.

Results: During the period under review, 432 consecutive patients were treated for pancreatic injuries of whom 27 (20 men, 7 women, median age 31, range 15–68 years) presented with delayed complications related to the initial pancreatic injury. Sixteen patients had non-resolving symptomatic pancreatic pseudocysts, 10 had persistent pancreatic fistulae and 1 had a symptomatic duct stricture. Fourteen patients with grade 2a, 3a, 3b or 4c main pancreatic duct injuries were successfully treated endoscopically with either pancreatic duct stenting or pseudocyst drainage while 13 patients with grade 4a or 4b duct injuries who had complete duct division with a disconnected duct syndrome failed endoscopic management and required surgical intervention. The 27 patients underwent a total of 49 endoscopic procedures (47 elective, 2 emergency) of whom 4 developed complications related to the endoscopic treatment. All 4 resolved, 2 after urgent endoscopic re-intervention.

Conclusion: In this preliminary analysis the Cape Town pancreatic ductal injury grading classification showed a close correlation with outcome after endoscopic and operative intervention.

Introduction

Injuries to the pancreas occur infrequently but may result in significant morbidity and mortality if the main pancreatic duct or adjacent viscera and vasculature are damaged [1,2]. Early mortality is most commonly due to uncontrolled bleeding from large visceral veins in close proximity to the pancreas or major injuries to nearby solid organs [3,4]. Late mortality is generally due to infection or multiple organ failure [5–7]. Neglect of a major ductal injury with retroperitoneal extravasation of pancreatic enzymes predisposes to delayed local complications, the most serious of which are pancreatic pseudocysts, persistent fistulae, intra-abdominal sepsis or secondary haemorrhage from major vessels adjacent to the pancreas [8–10].

While the management of acute pancreatic injuries is well documented, only limited data are available detailing the consequences of delayed complications following a severe pancreatic injury. Endoscopic intervention has no role in severely injured patients with acute pancreatic trauma but may be useful in haemodynamically stable patients who present later with complications related to the pancreatic trauma. On the basis of our previously published clinical experience we hypothesized that delayed local pancreatic complications that occur after a major

* Corresponding author. HPB Surgical Unit, Department of Surgery, University of Cape Town Health Sciences Faculty, Anzio Road, Observatory, 7925 Cape Town, South Africa. Tel.: +27 21 404 3072; fax: +27 21 448 0981.
E-mail address: jej.krige@uct.ac.za (J.E.J. Krige).

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pancreatic injury are likely due to main pancreatic duct damage and could thus theoretically be managed effectively by non-operative endotherapeutic methods such as pancreatic duct stenting or pseudocyst drainage [11–17]. To test this hypothesis the present study critically evaluated the efficacy of endotherapeutic pancreatic duct stenting and transmural cyst drainage in the management of delayed complications after a major pancreatic injury in a cohort of consecutive patients using robust and reliable methodology with objective and reproducible end-points.

Methods

Study design

The study design was a retrospective observational cohort analysis using a faculty approved and registered database which prospectively documents the details of all patients with pancreatic injuries treated in the Level 1 Trauma Centre and the Hepatopancreatobiliary and Surgical Gastroenterology units in Groote Schuur Hospital, Cape Town. Comprehensive details of the database have been reported previously [18–20]. After approval by the University of Cape Town Ethics and Research Committee, an analysis was done of consecutive patients who, beyond 6 weeks after the pancreatic injury, either developed a local complication (eg pseudocyst) or had a non-resolving complication (eg pancreatic fistula) related to a pancreatic duct injury between January 1990 and December 2013.

Data collection

All clinical records including operative, intensive care, radiology, endoscopic and multidisciplinary clinic reports of patients with pancreatic injuries were accessed from the database and reviewed [18–20]. Variables recorded in the database included patient demographic data, mechanism of injury, associated intra- and extra-abdominal injuries, injury to operation interval, anatomic site and grade of pancreatic injury, operative findings and surgical management, ERP findings and intervention, duration of hospital stay, presence and type of pancreas-related and other complications [18–20].

Pancreatic injuries were treated according to the trauma unit protocol, details of which have been published previously [17–20]. In patients undergoing an emergency laparotomy the pancreatic injury was assessed and graded according to the Pancreas Organ Injury Scale of the American Association for the Surgery of Trauma [21]. Initial resuscitation was according to Advanced Trauma Life Support (ATLS) guidelines. Urgent surgery was performed in patients who had an acute abdomen with signs of peritonitis, or evidence of major intra-abdominal bleeding or those in whom there was the clinical suspicion of a major pancreatic injury. Operative management of the pancreatic injury was according to a specific operative strategy based on the haemodynamic stability of the patient, the magnitude and extent of associated injuries and the location and severity of the pancreatic injury, strategic details of which have been published previously [17–20]. Minor lacerations of the body and tail of the pancreas remote from the pancreatic duct without visible duct damage were managed by external drainage. Major lacerations of the body or tail of the pancreas with evidence of a likely duct injury were treated by a distal pancreatectomy. Injuries to the head of the pancreas without devitalization of pancreatic tissue were managed by external drainage. Combined injuries involving the pancreas and duodenum were treated on the merits of each individual case. All pancreatic injuries were drained using closed silastic suction drains [17–20].

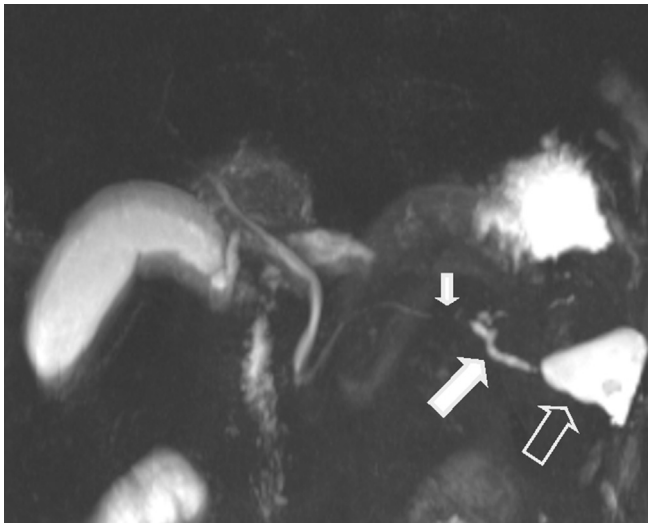

Fig. 1. MRCP showing a stricture (arrow head) in the mid main pancreatic duct with a fistula (white arrow) and a fluid collection (open arrow).

Patients who developed a delayed pancreatic complication as a consequence of an initial pancreatic injury were referred to the Surgical Gastroenterology and HPB unit for treatment. The diagnosis of a pancreatic duct fistula or stricture or pseudocyst was based on review of the original operative and clinical findings, fluid amylase levels, ultrasound and CT scan findings [11]. The site of the pancreatic duct fistula (head, neck, body or tail) was noted on MRCP and ERP (Fig. 1). The number and size of the pseudocyst(s) was measured in cm in 2 dimensions and location, relationship and proximity to stomach and duodenal wall recorded (Fig. 2). The degree and extent of the main pancreatic duct injury was assessed using the Cape Town pancreatographic grading system for pancreatic injuries modified from the original classification by Takishima et al. (Table 1).

ERP technique

ERP was performed in a dedicated ERCP endoscopy suite and supervised by hepatobiliary surgeons experienced in interventional endoscopy [11]. Blood was taken for coagulation screen before the

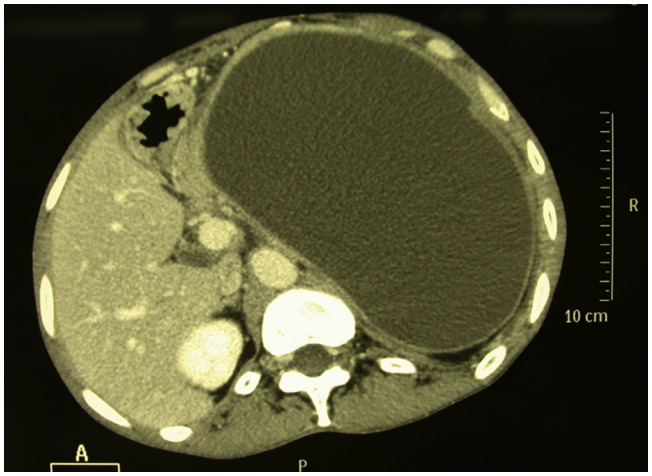

Fig. 2. CT scan demonstrating post-traumatic pseudocyst.

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