Letton-Wilson procedure for blunt traumatic pancreatic transection in a 9-year-old child

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ABSTRACT
A 9-year-old boy, who had a blunt blow to the epigastric abdomen by a bicycle handle, was transferred to our hospital. Enhanced computed tomography (CT) demonstrated the complete transection of the pancreas with the large hematoma between the pancreatic head and body. Pancreatic parenchyma preserving Letton-Wilson procedure composed of proximal stump closure and distal pancreaticojejunostomy was performed. The patient recovered without significant complications and was discharged on postoperative day 15. He had no abnormalities in the follow-up CT and endocrine function as well 1 year following surgery. We herein have reported this successful case in which Letton-Wilson procedure was successfully committed for blunt traumatic pancreatic transection in 9-year-old child.

Pancreatic trauma is uncommon, having been reported to account for only 0.2%–6% across abdominal trauma [1]. Associated injuries are responsible for the high mortality rate of 13.8%–31% [1]. Blunt upper abdominal trauma is the primary mechanism of injury to the pancreas. The implicated mechanism of trauma is from impalement of bicycle handle or flexed knee to the abdomen, against the underlying spinal column that tend to crush the pancreas creating a fracture at the junction of the pancreatic neck and body [2]. Pancreatic injury in children remains relatively uncommon, and is challenging in diagnosis with a complete pancreatic transection being exceptionally rare and difficult to manage. We herein have reported our experience of successfully performed Letton-Wilson procedure for the complete pancreatic transection in blunt trauma.

1. Case report

A 9-year-old boy was transferred to our hospital with severe abdominal pain, nausea and vomiting 6 h following a falling accident when he had a blunt blow to the epigastric abdomen by a bicycle handle. On his arrival, the general status was obviously distressed. He was tachycardic at 100/min and his blood pressure was 100/42 mm Hg. Physical examination revealed distention of the epigastric area with positive rebound tenderness and guarding. The laboratory results revealed a marked inflammatory response, a slight anemia and an elevation of pancreatic enzymes. Other laboratory data were within normal limits (Table 1). Computed tomography (CT) demonstrated a complete pancreatic transection with the hematoma formation in the vicinity (Fig. 1). Traumatic pancreatic transection was highly suspected in view of these physical, laboratories and imaging findings, therefore emergency exploratory laparotomy was prompted.

Intraoperatively, the large hematoma and bloody ascites were noticed in the bursa omentalis. The bursa omentalis was opened and the large hematoma spreading from the pancreatic head to the retroperitoneal space came into view. The hematoma was evacuated and the pancreas was found to be completely transected at the left side border of the superior mesenteric vein (Fig. 2). The pancreatic injury was consistent with IIIb and IV according to the Japanese Association for the Surgery of Trauma, and Luca’s category, respectively. Bleeding was completely controlled and he remained hemodynamically stable throughout the operation. There was no other organ injury. We chose the Letton-Wilson procedure in a keen effort to preserve the pancreas and spleen, taking this patient’s age into consideration. The proximal pancreatic stump was closed by a linear stapler, and the distal stump was invaginated into the Roux limb of the jejunum using 4–0 monofilament sutures (Fig. 3), and then side-to-side jejunojejunostomy followed.
19 French four-channel suction drains were placed in the right subphrenic, one each in cephalad and caudad to the pancreaticojejunostomy, the 4th one into the Roux limb of the jejunum for reduction of the undue tension to protect the pancreaticojejunostomy (Fig. 4). Operation time was 3 h and 28 min, the blood loss was 514 ml including evacuated hematoma and initial bloody ascites, and no transfusion was needed.

The two drains placed cephalad and caudad to the pancreaticojejunostomy were removed on postoperative day 4. Oral intake was started on postoperative (POD) day 4. On POD 5, the drain in the Roux limb of the jejunum was removed. Superficial surgical site infection was noted on POD 5, which was successfully managed and healed on POD 12. The patient recovered without further complications and was discharged on POD 15. He was followed-up about 12 months after the operation. The follow-up CT performed then failed to show any abnormalities in the distal pancreas and the pancreatic endocrine function remained normal.

2. Discussion

The clinical presentation of pancreatic trauma, especially blunt trauma, is often subtle because of the retroperitoneal location of the pancreas, frequently resulting in delayed treatment [3,4]. Prompt and accurate diagnosis, especially with respect to the major duct status and proper management, are needed to decrease morbidity and mortality. When abdominal CT imaging shows laceration of more than half of the parenchyma tissue, a major duct injury is highly suspected, mandating immediate surgery.

Inasmuch as nonoperative management has become the standard of care for most pediatric solid organ injuries, a number of centers have described “success” in applying this approach to all pancreatic injuries in children [5–9]. However, nonoperative management of blunt pancreatic injury that includes transection, remains controversy. Nonoperative management has the pros of preserving the pancreas function, and damages less than surgery.

<table>
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<th>RBC (×10^4/mm^3)</th>
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Letton-Wilson procedures in appropriately selected patients is a physiologically significant role, therefore, it was our opinion that Letton-Wilson procedures in appropriately selected patients is a superior option to distal pancreatectomy as a means to salvage more volume of glandular tissue. Nonetheless to say that preserving endocrine function is especially important in children for their growth and development.

Borkon et al. reported their institutional experience in the operative management of children sustaining complete pancreatic transection after blunt abdominal trauma and comparison of the outcomes for Letton-Wilson procedure and distal pancreatectomy [19]. Their results showed the distal pancreatectomy patients’ hazard ratio was 5.63 times more likely to tolerate full enteral feeds at earlier time more points than those in the Letton-Wilson procedure patients (confidence interval: 1.54–20.64, p = 0.009). Nevertheless, there was no statistical difference in postoperative hospital length of stay and postoperative complications between these two procedures when stratified for age, injury score, and pancreatic injury grade. They suggested that Letton-Wilson procedures conferred greater preservation of pancreatic and splenic tissues than distal pancreatectomy.

Spleen preservation is also important for protecting the child from increased susceptibility to sepsis associated with splenectomy [20,21]. With the realization that splenectomy renders patients, susceptible to the lifelong risk of infection, coupled with the small but lethal incidence of the syndrome of overwhelming postsplenectomy sepsis, needless splenectomy should be avoided. It is the usual practice to remove the spleen while resecting the distal pancreas because it shortens the operating time, especially when patients are unstable. However, recognition of immunological and hematological functions of the spleen and the risk of overwhelming sepsis in splenectomized patients has lead to concept of splenic preservation. Horan and Colebatch [22] showed that among children under 12 months of age at the time of splenectomy, 50% had severe sepsis, while Erkli et al. [23] noted that 8.1% of patients under 4 years old at the time of splenectomy died of sepsis. These date, coupled with increasing evidence that an intact spleen is required to produce important opsonins and Immunoglobulin M (IgM), led the author to preserve the spleen in children [24,25]. The spleen is a reservoir for monocytes, which are key regulators of inflammation [26]. Postsplenectomy reactive thrombocytosis has been implicated as an etiologic factor in myocardial infarction [27]. Splenectomized patients are also at increased risk of malignancy [28]. Many authors have reported the benefits of spleen-preserving distal pancreatectomy. As the other operative procedure for preserving spleen, in the Warshaw operation the splenic artery and vein are resected with the body and tail of the pancreas, and the spleen relies on the collateral vasculature via the short gastric and left gastroepiploic vessels to survive. The increased flow via these collaterals results in vascular dilation [29]. Ferrone et al. [30] reported that this operation had a postoperative failure rate of 1.9%, radiologic evidence of asymptomatic perigastric varices was identified in 25% of patients. There were no clinical consequences of perigastric varices in any patient during a follow-up period of up to 21 years.

Although totally laparoscopic distal pancreatectomy with splenic preservation has been reported [31], it was obviously not a choice of procedure in this case because the large hematoma was suspected of interfering the operative view and moreover, the pancreaticojejunostomy was technically challenging in laparoscopic surgery. The role of laparoscopic surgery in trauma is still controversial, however has been expected to evolve in the near future.

3. Conclusion

We propose that a pancreatic preserving operation rather than distal pancreatectomy with splenectomy might be the procedure of
choice for children with severe pancreatic injury with the transected main pancreatic duct, especially when stable vital signs are anticipated.

Conflict of interest statement
Naoya Okada and the other co-authors have no conflict of interest.

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