Case Report
Étude de cas

Penetrating trauma secondary to heterotopic ossification in a laparotomy scar: a case report

Nicholas Namias, MD;* Danny Sleeman, MD†

Heterotopic ossification is a common complication of numerous procedures, including abdominal operation, but traumatic perforation by such ossification is extremely rare. A 45-year-old man suffered traumatic perforation of the jejunum by ossification in a laparotomy scar. The diagnosis was made only at operation. The calcified mass was completely excised and the patient made a smooth recovery. The authors caution that the ossification may recur, and they recommend that such ossifications be removed electively if they are symptomatic or if their morphology is such that any viscera are at risk of perforation.

L'ossification hétérotrophe est une complication fréquente de nombreuses interventions, y compris à l'abdomen, mais une perforation traumatique causée par une telle ossification est extrêmement rare. Un homme de 45 ans a subi une perforation traumatique du jéjunum causée par une ossification dans une cicatrice de laparotomie. Le diagnostic n'a été posé qu'au moment de l'intervention. La masse calcifiée a été totalement excisée et le patient s'est rétabli sans problème. Les auteurs préviennent que l'ossification peut se répéter et ils recommandent de procéder à une ablation élective de ces ossifications si elles sont symptomatiques ou si elles risquent de perforer des viscères à cause de leur morphologie.

Traumatic perforation of viscera by heterotopic ossification is an extremely rare occurrence, although such ossification often occurs as a complication of numerous conditions, including abdominal operations.[1–9] We report a case of penetrating trauma to the jejunum by a heterotopic ossification in a laparotomy scar.

Case report

A 45-year-old alcoholic man was seen in the emergency department, complaining of diffuse, constant abdominal pain of 6 hours' duration. He reported that the pain had begun after he fell to the ground upon his return home from a drinking binge. He denied antecedent trauma (other than the previously described fall from standing height) or recent illness. His medical history was significant only for alcohol-related conditions (chronic pancreatitis and gastritis) and an operation 3 years earlier for repair of a bleeding Mallory–Weiss tear. He had undergone cholecystectomy at a second operation in the postoperative period for acute acalculous cholecystitis.

On examination he was cachectic and in obvious distress. His heart rate was 120 beats/min, blood presssure 110/80 mm Hg and respiratory rate 18 breaths/min. The abdomen was distended and tender, with a well-healed midline laparotomy scar. Bowel sounds were absent. Rectal examination was heme positive. Abnormal findings of laboratory investigations included a leukocyte count of 19×10^9/L, serum amylase 398 U/L and serum lipase 492 U/L. A supine radiograph of the abdomen was unremarkable. Abdominal computed tomography (CT) was performed to seek evidence of pancreatitis. The pancreas appeared normal, but a pneumoperitoneum (not detected by the less sensitive plain radiograph) and free peritoneal fluid were visible. In the area of the pre-existing laparotomy scar, abdominal wall calcifica-

*Fellow, Trauma and Critical Care, University of Miami/Jackson Memorial Medical Center, Miami, Fla.

†Assistant Professor in surgery, University of Miami/Jackson Memorial Medical Center

Accepted for publication Apr. 8, 1996

Correspondence to: Dr. Danny Sleeman, Department of Surgery (R-310), PO Box 016310, Miami FL 33199, USA

tions with projections into the peritoneal cavity were seen (Fig. 1). A preoperative diagnosis of perforated duodenal or gastric ulcer was made.

At laparotomy under general anesthesia, re-examination of the laparotomy scar revealed calcification of the abdominal wall in the previous midline incision, approximately 4 cm wide and extending from the xiphoid to near the pubis. During dissection of the calcification from the abdominal wall to enter the peritoneal cavity, it was noted that the mass had lateral cylindrical extensions, tapering to points. These were divided from the main mass to expedite access to abdomen. On entering the abdomen, we encountered a large volume of succus entericus, emanating from a puncture of the jejunum. The edges of the perforation were edematous and inflamed. The remainder of the examination gave negative results except for the peritoneal reaction to the free succus. The perforation was repaired with staples, and the abdomen was irrigated. One of the projections of the calcified mass was found to be growing into the omentum, tapering to a sharp point. The calcified mass was removed in its entirety. The postoperative course was uncomplicated, and the patient was well 3 months later, although future recurrence remains a possibility.

Discussion

This patient's condition presented a diagnostic challenge that was answered only at laparotomy. The history of alcoholism, chronic pancreatitis and a recent drinking binge led us to entertain the diagnosis of pancreatitis or a complication thereof. The CT findings of free intraperitoneal fluid and pneumoperitoneum suggested a perforated viscus, but the traumatic nature of the perforation was not appreciated until operation. It appeared that the most likely cause of the perforation was puncture by the sharp heterotopic ossification; however, the remote possibility exists that the perforation was unrelated to the ossification. The calcified mass proved, histologically, to be lamellar bone (Fig. 2).

Heterotopic ossification is a well-described sequela to numerous conditions, including total hip arthroplasty,[1] shoulder arthroplasty,[2] knee arthroplasty,[3] intramedullary nailing of the tibia,[4] burns,[5] spinal cord injury[6] and abdominal operation.[7–9] The true incidence of heterotopic ossification in an abdominal scar has not been reported. A review in 1978 enumerated 40 reported cases and added 4 new ones.[10] Subsequent reports have been few.[9,11,12] The pathogenesis of heterotopic bone formation has not been completely elucidated; however, two proposed mechanisms seem most probable. The first is based on seeding of osteogenic cells during surgery or trauma.[7] The second is the stimulation of differentiation of multipotent mesenchymal cells by numerous factors, including a circulating bone morphogenetic protein that is known to promote bone formation by chemotaxis, mesenchymal proliferation, deposition and vascularization of cartilage, osteoblast mediated osteogenesis and remodelling with formation of lamellar bone.[7,13]

This patient's ossification could be explained by either of the above-mentioned mechanisms. It is likely that the xiphoid process was disturbed during the previous operation for treatment of a bleeding Mallory–Weiss tear, serving as a source for osteogenic cells. Bone formation after xiphoidectomy has been described.[14] The stimulation of multipotent mesenchymal cells is also possible, although the reason for the stimulation of these cells in some patients and not in others is unknown.

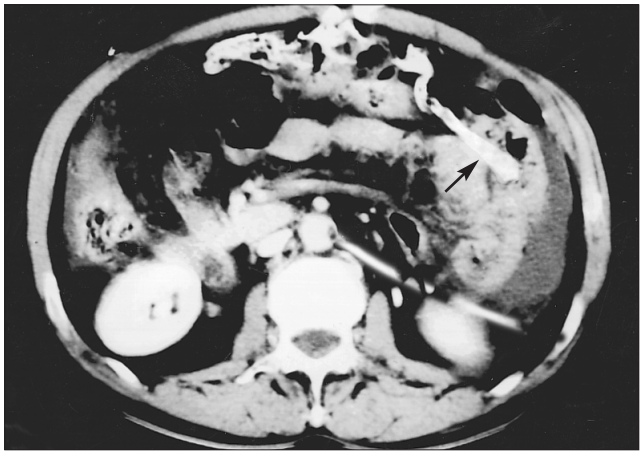

FIG. 1. Computed tomogram revealing abdominal wall calcification. Arrow shows intraperitoneal projection of calcification.

FIG. 2. Photomicrograph of abdominal wall calcification shows lamellar bone (hematoxylin–eosin, original magnification ×100).

In summary, a case of intestinal perforation by a projection of a heterotopic ossification in a laparotomy scar has been described. Consideration should be given to elective removal of such ossifications that are symptomatic or when the morphology is such that the ossification poses a threat of injury to the viscera.

We thank Dr. Armando Camp for assistance in obtaining the photomicrograph.

References

1. Nollen JG, van Douveren FQ. Ectopic ossification in hip arthroplasty. A retrospective study of predisposing factors in 637 cases. *Acta Orthop Scand* 1993;64(2):185-7.
2. Kjaersgaard-Andersen P, Frich LH, Sojbjerg JO, Sneppen O. Heterotopic bone formation following total shoulder arthroplasty. *J Arthroplasty* 1989;4(2):99-104.
3. Harwin SF, Stein AJ, Stern RE, Kulick RG. Heterotopic ossification following primary total knee arthroplasty. *J Arthroplasty* 1993;8(2):113-6.
4. Gosselin RA, Belzer JP, Contreras DM. Heterotopic ossification of the patellar tendon following intramedullary nailing of the tibia: report on two cases. *J Trauma* 1993; 34(1):161-3.
5. Koch BM, Wu CM, Randolph J, Eng GD. Heterotopic ossification in children with burns: two case reports. *Arch Phys Med Rehabil* 1992;73 (11):1104-6.
6. Wittenberg RH, Peschke U, Botel U. Heterotopic ossification after spinal cord injury. Epidemiology and risk factors. *J Bone Joint Surg [Br]* 1992; 74(2):215-8.
7. Myers MA, Minton JP. Heterotopic ossification within the small bowel mesentery. *Arch Surg* 1989;124(8): 982-3.
8. Barthel HJ. Abdominal wall ectopic bone formation with previous abdominal surgery. *J Fam Pract* 1987; 24(4):410-1.
9. Orda R, Barat M, Wiznitzer T. Heterotopic bone formation in abdominal operation scars. *Injury* 1984;15 (5):334-6.
10. Pearson J, Clark OH. Heterotopic ossification in abdominal wounds. *Surg Gynecol Obstet* 1978;146:371-4.
11. Apostolidis NS, Legakis NC, Gregoriadis GC, Androulakakis PA, Romanos AN. Heterotopic bone formation in abdominal operation scars. Report of six cases with review of the literature. *Am J Surg* 1981;142(5): 555-9.
12. Eke N, Warrington AJ: Ossification in abdominal scars. *J R Soc Med* 1981;74(19):653-5.
13. Urist MR, Leitze A, Mizutani H, Takagi K, Triffitt JT, Amstutz J, et al. A bovine low molecular weight bone morphogenetic protein (BMP) fraction. *Clin Orthop* 1982;162:219-32.
14. Watkins GL. Bone formation in abdominal scars after xiphoidectomy. *Arch Surg* 1964; 89:731-4.