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Original article

Aortic injuries during laparoscopic gastric bypass for morbid obesity in Sweden 2009–2010: A nationwide survey

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Abstract

Background: In Sweden, bariatric surgery has increased more than tenfold in the past decade, from 700 to 8,600 procedures annually, and laparoscopic gastric bypass (LRYGB) dominates (92% of all procedures). This expansion makes safety issues crucial. The aim of this nationwide survey was to identify aortic injuries in LRYGB.

Methods: All 41 centers performing LRYGB in Sweden were asked if an aortic injury had occurred during the years 2009–2010. Techniques for entering the first trocar and way of establishing pneumoperitoneum were evaluated. The total number of procedures was collected from the national quality registry, Scandinavian Obesity Surgery Registry (SOReg), and the National Patient Register.

Results: During the study period, 11,744 LRYGBs were performed. The analysis revealed 5 aortic injuries, all occurring in patients in whom an optical trocar had been placed before establishing pneumoperitoneum. Outcomes varied from no major sequelae to bilateral lower limb amputation and death. Based on the total number of LRYGBs, the risk for an aortic injury was .043% overall and .091% when an optical trocar was used.

Conclusion: Aortic injury is a rare but serious complication in laparoscopic gastric bypass. In this survey, optical trocars constructed to reduce the risk of intraabdominal damage had been used in all 5 cases. (Surg Obes Relat Dis 2014;10:203–209.)

Keywords: Gastric bypass; Aortic injury; Optical trocar; Trocar injury; Laparoscopy

The number of morbidly obese patients seeking medical help is greater than ever, as is the number of bariatric procedures performed worldwide. In Sweden, bariatric surgery has increased more than tenfold in the past decade (700 to 8,600 procedures), and in 2010, 67 bariatric procedures were performed per 100,000 inhabitants, with a 30-day mortality of .05% [1–3]. Gastric bypass was the most common procedure (97%), and most (94%) were performed by laparoscopic technique [3]. Although this technique has many advantages over open surgery, some specific problems exist in laparoscopic gastric bypass (LRYGB). To start with, the blind passage of the first trocar adds a potentially dangerous maneuver. In bariatric patients, exposure and handling of intraabdominal structures can be difficult even after establishing a working space by pneumoperitoneum. Anatomic orientation is more demanding in laparoscopic than in open surgery, and severe misjudgments have occurred [4].

This study deals with aortic injuries, an infrequent but serious complication that can occur when entering the abdomen in laparoscopic surgery. There are 3 principally different techniques to place the first trocar: (1) insertion after initial pneumoperitoneum with the Veress´ needle; (2)

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open insertion of the first trocar through a dissected channel, i.e., Hasson technique [5]; and (3) using an optical trocar, in which the passage through the different layers in the abdominal wall can be visualized on-screen. No technique is perfect, as intraabdominal injuries have occurred in all 3 techniques [6–11]. Injuries to the great vessels were reported in a total of 93 cases in 3 large national studies [7–9], resulting in a calculated risk of .05%. However, underreporting of serious vascular injuries or other rare complications is always conceivable.

Since 2008, all centers performing bariatric surgery in Sweden have reported to a national quality registry, the Scandinavian Obesity Surgery Registry (SOReg). SOReg contains preoperative data, operative technique, and outcome on both a short-term and a long-term basis. Initially, it was possible to register only completed bariatric procedures; unfinished procedures due to anesthesiologic or surgical reasons were lost. In a short period of time, 3 cases of aortic injuries were identified and discussed nationally [12]. This prompted the present survey.

The aim of this retrospective nationwide study was to identify aortic injuries in LRYGB during 2009–2010 and to relate these to the technique routinely used for placement of the first trocar.

Methods

During the study period, LRYGB was performed in 41 centers. Heads of the bariatric or surgical departments were contacted by SOReg representatives (M.S., J.O.) and received a questionnaire on aortic injuries. The questionnaire also contained questions concerning techniques for entering the first trocar (before or after pneumoperitoneum) and way of establishing pneumoperitoneum (Veress´ needle or by the first trocar). Initially, 39 answered (93%), and after a telephone reminder, data was available from all 41 centers.

The total number of procedures during the study period was collected from SOReg and was found to conform to the National Patient Register, kept by the National Board of Health and Welfare. The National Patient Register officially registers all inpatient surgical procedures and holds information on name of hospital, admission and discharge dates, and ICD-codes for diagnosis. The validity of this register is assessed by the National Board of Health and Welfare [13], and in an external review in 2011, 99% of the admissions were found to have a registered main diagnosis [14].

The survey was approved by the Regional Ethical Review Board at the University of Uppsala, Sweden. Descriptive statistics was used, and differences between groups were evaluated by two-tailed χ^2 test. A $P < .05$ was considered statically significant.

Results

During 2009–2010, 11,744 LRYGBs were performed. The survey revealed 7 suspected aortic injuries, all in patients in whom an optical trocar had been placed before establishing pneumoperitoneum. Two cases, however, were excluded from the analysis; in one case, the aortic injury had occurred in 2008, and in the other case, the patient record showed that the reported aortic injury was in fact damage to the proximal part of the inferior mesenteric artery. Thus, a total of 5 aortic injuries, confirmed by patient records, were included in the analysis. The aortic injuries had occurred in both low-volume (<100 cases per year) and high-volume centers.

All 5 patients were female with a median age of 48 (28–62) years and body mass index (BMI) of 44 (35–48) kg/m^2. Three of the patients had undergone previous abdominal procedures: 1 laparoscopic cholecystectomy, 1 open appendectomy, and 1 hysterectomy. One of the aortic injuries was obvious because blood immediately passed through the trocar, but in the remaining 4 cases, time to diagnosis of the aortic injury varied. The surgeon was alerted by a combination of circulatory instability and visible blood or retroperitoneal hematoma well after the remaining trocars had been placed. All procedures were converted to open surgery by a midline incision. After initial compression, the stab wound in the aorta was repaired. Median perioperative bleeding was estimated to be 2,500 mL (1,500–3,500 mL). The planned gastric bypass procedure was abandoned, except in one case for which an open procedure was performed. Outcomes varied from no major sequels (n = 3) to massive thrombosis in the lower extremities with subsequent bilateral lower limb amputation (n = 1) to death due to cerebral anoxia (n = 1). Details are given in Table 1.

According to the questionnaire, pneumoperitoneum was established by a Veress needle before placing the first trocar in 43.8% of all LRYGBs (15 centers). In the remaining cases, the first trocar was placed without previous pneumoperitoneum. An optical trocar was used in 46.6% of all cases (18 centers), and 9.7% (8 centers) used an open technique with a blunt tipped trocar. During the study period, the overall risk for an aortic injury in LRYGB was .043%, and risk was .091% when an optical trocar was used ($P = .017$). No aortic injuries occurred when using the other 2 techniques (Table 2).

Discussion

In this nationwide survey, 5 cases of aortic injuries in 11,744 LRYGBs were observed during a 2-year period. All injuries occurred in patients for whom an optical trocar had been used. In morbidly obese patients, the thick abdominal wall complicates the passage of the first trocar. Even though the abdomen looks big to the eye, the abdominal cavity is not larger in morbidly obese patients than in normal weight patients. This makes the intraabdominal distance to the great vessels identical to normal weight individuals, in whom it will be considerably shortened by the pressure of the first trocar, as shown in Fig. 1.