

# Strangulated femoral hernia containing a perforated appendix

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Approximately 27 000 cases of femoral hernia occur yearly in the USA, accounting for 3% of all hernias. The hernial sac may contain preperitoneal fat, omentum, small bowel or colon and, rarely, the appendix, reported to occur in 0.8% of femoral hernias.<sup>1</sup> To date, only 12 cases of perforated appendicitis in a femoral hernia have been documented, none in the past 13 years.<sup>2-10</sup> Because of the unusual, rare presentation, management is not well defined. Based on our experience and on previously reported cases, we present relevant trends in diagnosis and management of this rare clinical entity.

## Case report

An 88-year-old man presented with a 2-day history of a painful mass in his right groin. Abdominal examination disclosed mild tenderness in the right lower quadrant. A 6-cm right inguinal mass was palpated that was non-reducible and exquisitely tender to palpation. The leukocyte count was  $13.4 \times 10^9/L$ . The preoperative diagnosis was strangulated inguinal hernia. At laparotomy, a large, edematous, inflamed femoral mass, medial to the femoral vein, was identified. The anterior surface was opened, and purulent fluid was drained. The hernial sac was found to contain a perforated appendix. After appendectomy, the sac was closed at its base, and the redundant portion was amputated. The femoral hernia was repaired by suturing the iliopubic tract to Cooper's ligament. Pathological examination of the excised specimen demonstrated acute and chronic appen-

ditis with perforation of the appendix and periappendicitis in the hernial sac. Postoperatively, the patient was given a 4-day course of antibiotics intravenously.

## Comment

The rare occurrence of a femoral hernia containing the appendix may be attributed to abnormal anatomical positions, possibly from different degrees of intestinal rotation during development or from variations in its attachment to the cecum. It has also been speculated that a very large cecum, extending into the pelvis, can give rise to the appendix entering a hernial sac.<sup>11</sup> Ultimately, compression of the neck of the femoral hernia and eventual strangulation may result in acute

appendicitis and eventual perforation.

The diagnosis of appendicitis in a femoral hernia, however, is extremely challenging and is almost never made preoperatively. To date, only 1 such case has been incidentally diagnosed preoperatively, by computed tomography (CT).<sup>12</sup> Clinical symptoms, which are commonly indicative of incarcerated femoral hernia, include vague abdominal pain, painful swelling and erythema of the right groin, reported in many series. The duration of these symptoms varies widely, from 2 days to 15 years (Table 1<sup>2-10</sup>). Signs and symptoms of acute appendicitis, however, are often overshadowed by findings of an incarcerated femoral hernia. General abdominal peritonitis is usually absent despite perforation because the tight

Table 1

Clinical Features and Outcomes of Perforated Appendix in Femoral Hernia

Report	Year	Patient age, yr	Gender	Duration of symptoms	Outcome
Waring	1891	46	F	2 yr chronic, 1 d acute	Uncomplicated
Hodgson <sup>2</sup>	1925	70	F	8 mo	Uncomplicated
Holliday and White <sup>3</sup>	1953	57	F	2 wk	Uncomplicated
Carey <sup>4</sup>	1967	48	M	5 mo chronic, 5 d acute	Wound infection
Gerami et al <sup>5</sup>	1970	71	M	5 mo	Uncomplicated
Voitk et al <sup>6</sup>	1974	59	F	15 yr	Uncomplicated
		76	F	6 mo	Died
Cuotolo et al <sup>7</sup>	1978	73	F	14 d	Wound infection
Watkins <sup>8</sup>	1981	72	F	6 wk	Uncomplicated
Rose and Cosgrove <sup>9</sup>	1988	72	F	1 wk	Uncomplicated
		86	F	2 d	Uncomplicated
Guirguis et al <sup>10</sup>	1989	80	F	5 d	Necrotizing fasciitis
Nguyen	2004	88	M	2 d	Uncomplicated

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hernia neck contains the purulent content. This suggests that acute appendicitis in femoral hernia may be a consequence of incarceration and strangulation of the appendix rather than the usual internal obstruction due to lymph node hypertrophy or an appendicolith. This presentation occurs more commonly in femoral hernia than in other hernia types due to the narrowness and rigidity of the femoral canal.<sup>12</sup>

The combined data from all cases cited showed that femoral hernias occur more frequently in women than men, in a ratio of slightly less than 2:1. Femoral hernias containing perforated appendices also show a predisposition in women, in a ratio of greater than 3:1 (77% women v. 23% men). The mean age of patients is 69 years, demonstrating a trend toward presentation in the elderly population.

Due to the paucity of cases, no standard treatment exists, and options tend to vary widely. Management in reported cases has included incision and drainage with delayed appendectomy<sup>6</sup> or immediate appendectomy followed by hernia repair.<sup>8</sup> The repair techniques have also been diverse and include Cooper's ligament repair<sup>4</sup> or use of the preperitoneal approach.<sup>9</sup> Despite the available treatment options, the rate of wound infection is 5-fold greater than that of intraperitoneal perforated appendicitis (23% v. 4.7%).<sup>13</sup> Using combined data, we found that factors contributing to the increased incidence of infection are related to the

delay in diagnosis of these patients, multiple tissue planes involved in the repair, poor nutritional status and older age of these patients. These factors likely also contribute to the reported grave complications of necrotizing fasciitis and death.<sup>10</sup>

In conclusion, perforated appendicitis in a femoral hernia remains a challenging diagnosis due to its extremely rare occurrence. The diagnosis depends on sound clinical judgement and should be considered in elderly women presenting with signs of a strangulated hernia. Diagnostic imaging, such as CT, can be helpful. The potential for complication in these cases is great and does not appear to be affected by different operative strategies. Acute awareness and early operation appear to be the key to preventing this rare condition and its potentially drastic ramifications.

**Competing interests:** None declared.

#### References

1. Wise L, Tanner N. Strangulated femoral hernia appendix with perforated sigmoid diverticulitis. *Proc R Soc Med* 1963;56:1105.
2. Hodgson N. Strangulated femoral hernia associated with an appendix abscess in the hernial sac. *Br J Surg* 1925;13:386.
3. Holliday TD, White JR. Inflamed appendices in femoral sacs. *BMJ* 1953;11:779.
4. Carey LC. Acute appendicitis occurring in hernias: a report of 10 cases. *Surgery* 1967;61:236-8.
5. Gerami S, Easley GW, Mendoza CB Jr. Appendiceal abscess as contents of right femoral hernia. A case report. *Int Surg* 1970;53:354-6.
6. Voitk AJ, Macfarlane JK, Estrada RL. Ruptured appendicitis in femoral hernias: report of two cases and review of the literature. *Ann Surg* 1974;179:24-6.
7. Cuotolo LC, Wasserman I, Pinck RL, Mainzer RA. Acute suppurative appendicitis occurring within a femoral hernia: report of a case. *Dis Colon Rectum* 1978; 21:203-4.
8. Watkins RM. Appendix abscess in a femoral hernia sac — case report and review of the literature. *Postgrad Med J* 1981;57: 306-7.
9. Rose RH, Cosgrove JM. Perforated appendix in the incarcerated femoral hernia: a place for preperitoneal repair. *NY State J Med* 1988;88:600-2.
10. Guirguis EM, Taylor GA, Chadwick CD. Femoral appendicitis: an unusual case. *Can J Surg* 1989;32:380-1.
11. Lane MJ, Liu DM, Huynh MD, Jeffrey RB Jr, Mindelzum RE, Kats DS. Suspected acute appendicitis: nonenhanced helical CT in 300 consecutive patients. *Radiology* 1999;213:341-6.
12. Zissin R, Brautbar O, Shapiro-Feinberg M. CT diagnosis of acute appendicitis in a femoral hernia. *Br J Radiol* 2000;73: 1013-4.
13. Rucinski J, Fabian T, Panagopoulos G, Schein M, Wise L. Gangrenous and perforated appendicitis: a meta-analytic study of 2532 patients indicates that the incision should be closed primarily. *Surgery* 2000; 127:136-41.

### Correction

The correction that appeared in the December 2003 issue on page 466 contained an error. The reference *Can J Surg* 2002;34:264-8 should have read *Can J Surg* 2002;45(4):264-8. We apologize to our readers for this mistake.