

Vermiform Appendix Inside A Hernia: Our Experience

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Abstract

Aim: The presence of the vermiform appendix inside a hernia sac is usually called Amyand's or De Garengot Hernia. The purpose of this study is to report our experience with 12 cases within the last 15 years. **Methods:** We searched patient files of our department since 1992 and found 12 cases of patients with the appendix found inside a hernia. Patient characteristics, treatment and postoperative outcome were analyzed. **Results:** There were ten men and two women with a median age of 74 years (range 55-90). Seven patients (six males, one female) presented to the emergency department with a tender inguinal mass and were operated under the diagnosis "strangulated hernia", with an inflamed appendix inside the hernia found intraoperatively in six of them while in one male patient a strangulated sliding hernia containing the cecum with the appendix was found. Appendectomy was performed in all patients but the one with the strangulated sliding hernia. Hernias were repaired with the use of synthetic patch or suture technique depending on individual patient characteristics. The other four male patients were routinely operated for right inguinal hernia and the appendix was found intraoperatively. Appendectomy was performed in all patients and the hernia was repaired with the use of a polypropylene mesh. The other female patient was operated for an incisional hernia (right lower quadrant) and appendectomy was performed with suture repair of the hernia. **Conclusion:** The inflammatory status of the appendix combined with the patient's individual characteristics determines the hernia repair. Appendectomy should be performed as long as it does not complicate the recovery of the patient.

INTRODUCTION

It is a generally rare condition to find the appendix within an inguinal hernia. De Garengot in 1731 was the first to describe successful drainage of an acutely inflamed appendiceal groin abscess [1], while in 1735 Amyand reported the first appendiceal resection for appendicitis in the sac of an inguinal hernia [2]. The appendix can be found inside an inguinal hernia during a routine hernia repair and the incidence varies amongst references from 0.5 to 1% [3-5]. The finding of acute appendicitis in inguinal hernias is reported to be as low as 0.08% [3]. However, there have been case reports of left inguinal hernias containing the appendix [6], while the appendix has been found in port-site hernias after laparoscopic surgery [7].

The treatment in such a rare situation remains controversial. There are questions to be answered such as: is it safe to perform an appendectomy when finding the appendix during a routine hernia repair and thus risk an increase in morbidity by combining an aseptic operation (hernia repair) with a contaminated one (appendectomy)? Is it safe to use a synthetic mesh or patch in the above situation and what if

appendicitis is present? There have been reports of appendicitis shortly after laparoscopic hernia repairs, where the surgeon cannot visualize the sac contents. It remains a mystery in a case of a hernia containing the appendix whether the remaining of the appendix can cause future problems [8].

The diagnosis of a hernia containing the appendix is usually made intraoperatively. Many surgeons suggest that appendectomy should be performed and the hernia should be repaired without the use of a synthetic mesh [9,10], while others propose laparoscopic appendectomy and open hernia repair without the use of a prosthetic mesh [11].

Considering the fact that such a situation is rare and the diagnosis is almost always made intraoperatively, surgeons should be able to deal with the situation and decide how to best manage the patient.

MATERIAL AND METHODS

From January 1992 since August 2008, 4.308 hernias have been operated in our department and 782 appendectomies have been performed. Out of those, 1748 were right inguinal

hernias. We have searched the records of the clinic and found 12 cases where the appendix was inside the hernia sac. Ten of them were right inguinal hernias in males, where acute appendicitis was documented via histological examination in 4 patients while in one patient the appendix was perforated in the scrotum. In the other 2 cases the appendix was found inside an incisional hernia, both patients were female and the appendix was inflamed in one case.

RESULTS

We report 12 cases where the appendix was found inside a hernia sac (12/4308, 0.28%), of which 10 were right inguinal hernias (0.57%, 10/1748) and 2 were incisional hernias in women (one right paramedian, one right lower quadrant incisional hernia). During the same period, 782 appendectomies have been performed, of which 6 inflamed appendices were found inside a hernia sac (0.77%, 6/782).

The characteristics of these patients are shown in table 1 and table 2.

Figure 1

Table 1: Characteristics of patients, procedures and outcome

age	gender	type of hernia	Appendix found inside hernia sac	type of surgery	Post surgical recovery
65	male	inguinal right	Inflammatory	appendectomy repair with Bassini technique	normal
77	male	inguinal right	Inflammatory	appendectomy repair with ePTFE patch	normal
82	male	inguinal right	perforated, plastron	appendectomy repair with ePTFE patch	trauma infection
78	male	inguinal right (recurrent)	Inflammatory	appendectomy repair with ePTFE patch	normal
73	male	right sliding hernia (containing cecum with appendix)	inflammatory with exudative effusion inside the sac	appendectomy repair with polypropylene mesh	normal
76	male	inguinal right	normal	appendectomy repair with polypropylene mesh	normal
78	male	inguinal right	normal	appendectomy repair with polypropylene mesh	normal
55	male	inguinal right	normal	appendectomy repair with polypropylene mesh	normal
69	male	inguinal right	normal	appendectomy repair with polypropylene mesh	normal
65	male	right sliding inguinal (containing cecum and appendix), strangulated	normal	repair with ePTFE patch	normal
90	female	right paramedian incisional hernia	Inflammatory, plastron	appendectomy suture repair	normal
81	female	right lower quadrant incisional hernia	normal	appendectomy suture repair	normal

Figure 2

Table 2: Base line characteristics of the patients

Age (years)	
Average	74
Range	55-90
Gender	
Male	10 (83.33%)
Female	2 (16.66%)
Clinical Presentation	
Tender mass	7 (58.33%)
Routine finding	5 (41.66%)
Appendix	
Inflammatory	6 (50%)
Normal	6 (50%)

Seven patients (six males, one female) came to the emergency department of the hospital with a tender mass in the inguinal area and they were operated under the diagnosis of strangulated hernia.

In three patients (all males) a catarrhal appendix was found inside the sac without major clinical signs of inflammation. Appendectomy was performed and the hernia was repaired through the same incision, with the use of a polytetrafluoroethylene (ePTFE) patch (modified Lichtenstein technique) in two patients, because the condition of the abdominal wall did not allow an efficient suture repair (in one patient there was a recurrence of a right inguinal hernia, Figure 1).

Figure 3

Figure 1. Catarrhal appendix in a sac of a recurrent right inguinal hernia



Patients were given ampicillin/sulbactam IV preoperatively. Intraoperatively, netilmicine and metronidazole IV were added, when an inflammatory appendix was found, followed by a 3-day administration of the same antibiotics. After the 3rd postoperative day ampicillin/sulbactam IV was continued until the 5th postoperative day. In all patients a negative pressure drainage tube was placed and it was removed on the third postoperative day. Patients were discharged on the 5th postoperative day. The third patient had appendectomy and hernia repair using the Bassini technique. He received ampicillin/sulbactam IV for 3 days; a negative pressure drainage tube was placed and removed on the 1st postoperative day. The patient was discharged on the third postoperative day.

One patient had a perforated appendix inside a plastron in the sac. Appendectomy was performed and the hernia was repaired with the use of ePTFE patch due to a weak abdominal wall which made a suture repairing technique inefficient. Preoperatively, the patient was given a dose of ampicillin/sulbactam with metronidazole IV, followed by ceftriaxone, netilmicine and metronidazole IV postoperatively. A negative pressure drainage tube was inserted, with an additional drainage tube in the scrotum. The drainage tubes were not removed on the 3rd postoperative day because they were still draining. In this patient a mild wound infection (cellulitis) was noticed around the 5th postoperative day. Netilmicine and metronidazole were stopped the on the 7th postoperative day when signs of trauma infection subsided and the drainage tubes were removed. Patient received ceftriaxone IV until

the 12th postoperative day when he was allowed to leave hospital.

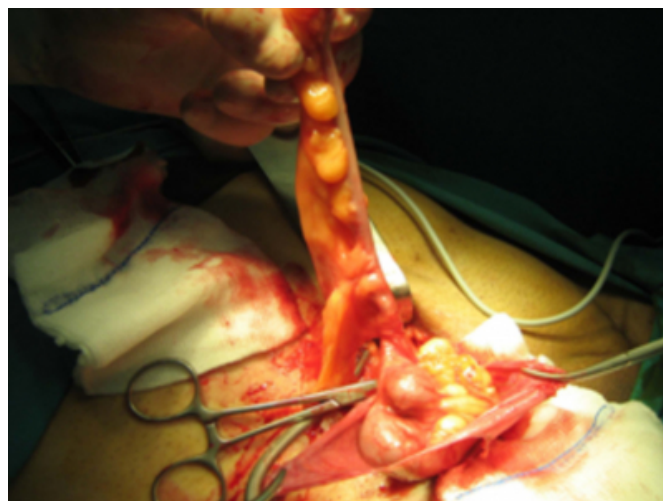
One patient had a sliding hernia containing cecum and appendix. The appendix was inflamed with exudative effusion inside the hernia sac. Appendectomy was performed and the hernia was repaired with the use of a polypropylene mesh. The patient received ampicillin/sulbactam IV preoperatively, with the addition of netilmicine and metronidazole IV intraoperatively. A negative pressure drainage tube was placed. Netilmicine and metronidazole were stopped on the 3rd postoperative day, ampicillin/sulbactam were stopped on the 5th postoperative day and the patient was discharged.

One patient had a strangulated right sliding hernia. The hernia contained the cecum with the appendix. The hernia was repaired with the use of an ePTFE patch, appendectomy was not performed and a negative pressure drainage tube was placed. The antibiotic used was ampicillin/sulbactam IV (for 3 days) and then the patient was discharged.

The other four male patients were operated routinely for inguinal hernia and during surgery a normal appendix was found inside the sac. Appendectomy was performed in all patients and the hernia was repaired with the use of a polypropylene mesh (Figure 2).

Figure 4

Figure 2. Appendix in a sac of a right inguinal hernia during routine hernia repair



Patients received ampicillin/sulbactam and metronidazole IV for 3 days, followed by ampicillin/sulbactam IV for 2 days before leaving the hospital. Negative pressure drainage tubes were used in all patients and were removed after a couple of days.

We also report two more cases of appendix found inside the sac of a hernia, only this time the appendix was found inside the sac of a right incisional hernia. Both patients were female. In one patient the appendix was a chance finding during routine surgery for an incisional hernia (after former gynecological surgery with right lower quadrant incision). The other patient had an inflamed appendix with a plastron formed that was found intraoperatively (after the patient had been led to the operating room with a false diagnosis of a “strangulated hernia”), at the site of a right paramedian incision for cholecystectomy about 30 years ago. In both patients appendectomy was performed and the hernia was repaired with suture technique. Ampicillin/sulbactam with metronidazole IV were used for three days and negative pressure drainage tubes were inserted during surgery.

DISCUSSION

The finding of the appendix inside a hernia is a rare condition. The appendix is more frequently found inside a right inguinal hernia, though it can also be found in other types of hernia. This may happen during routine surgery for hernia repair as a chance finding or intraoperatively during surgery for a false diagnosis of strangulated hernia.

The use of a synthetic mesh or patch in hernia repair when the appendix is found inside the sac is controversial. Many writers support that synthetic materials should not be used when appendicitis is present [12] and that if a normal appendix is found appendectomy is not necessary [13]. But in case of an elderly person, the possibility of appendicitis in the future, albeit low, can cause serious complications, maybe more serious than appendectomy during the hernia repair.

We used a synthetic mesh in four out of six patients with inflamed appendix inside the hernia sac. The patients' age and abdominal wall condition made a suture repair technique inefficient. We reported only one postoperative complication (trauma infection), but the mesh used did not have to be removed. We used mainly an ePTFE patch in these patients because such materials are more easily removable and because these materials are less prone to inflammation than polypropylene meshes, though in one case a polypropylene mesh was successfully used.

In the other four patients with a normal appendix inside the hernia sac we used a repair technique with a polypropylene

mesh without any complication.

CONCLUSION

We conclude that it is relatively safe to use a synthetic mesh or patch in hernia repair when a normal appendix is found inside the hernia sac and the appendix can be removed as the removal may protect the patient from future appendicitis and surgery does not complicate the recovery of the patient. When an inflamed appendix is found inside a hernia sac appendectomy should be performed and the hernia should be repaired with a suture technique. Although we have successfully used techniques requiring synthetic materials in certain individuals, this should be an option only if suture technique is inefficient. When the appendix is in an early catarrhal condition and the sac is excised, it seems to be safe to use a synthetic mesh if necessary and all precautionary measures, such as a clean technique, use of drainage tubes and appropriate antibiotic prophylaxis, are taken.

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