Acute appendicitis

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Abstract

Appendicitis is defined as inflammation of the vermiform appendix, the most common surgical emergency in children and young adults with abdominal pain. The current standard of care for patients with appendicitis is the surgical appendicectomy, either laparoscopic or open. A non-operative strategy with antibiotics is favourable in some cases and emerging evidence suggests there could be wider applicability. Diagnosis is based on history, clinical examination and laboratory tests, although 30–45% of patients exhibit atypical signs and symptoms on presentation. Where the diagnosis remains ambiguous, ultrasound and CT scans are the most widely used imaging modalities. Diagnostic laparoscopy can be a useful approach in low-risk patients, particularly young women. Appendicitis is classified into simple or complex disease, complex in the presence of a peri-appendicular abscess, gangrene or perforation. Complex appendicitis has significantly higher rates of morbidity and mortality. Limiting the progression from simple to complex disease, although not inevitable, is the rationale for early definitive treatment. An appendicectomy performed for suspected appendicitis resulting in a normal appendix on histopathological examination is referred to as a negative appendicectomy. A negative appendicectomy has a postoperative complication rate of around 10%, demonstrating the need for both accurate and timely diagnosis.

Keywords Appendicectomy; appendicitis; appendicular; appendix; McBurney's point; right iliac fossa pain

Introduction

Appendicitis is defined as inflammation of the vermiform (worm-shaped) appendix, a narrow blind ending pouch approximately 5–9 cm long opening off the caecum. Appendicitis is common; over 50,000 emergency appendicectomies are performed each year in the UK.

Mortality associated with appendicitis in developed healthcare settings is estimated between 0.05 and 0.25%; however, for patients presenting with perforated appendicitis and generalized peritonitis mortality remains as high as 5%. Morbidity and mortality is increased in complex appendicitis, defined as appendicitis in the presence of a peri-appendicular abscess, gangrenous or perforated appendix.[1,2]

Background

The ancient Egyptians recognized the presence of the appendix during the mummification process, described as the 'worm of the bowel'. Early accounts of an illness suggestive of appendicitis were by Celsus and Galen in the 1st and 2nd century, it was called a 'colic passion'.[3]

The Italian anatomist Berengius Carpus in 1522 published the first formal description of the appendix (referred to as the 'additamentum') but it was not until 1735 whilst operating on a hernia, military surgeon Claudius Amyand documented the first appendicectomy. Amyand's hernia is now the eponymous name given to an inguinal hernia containing the appendix.

In 1880, British surgeon Lawson Tait performed the first known successful appendicectomy for suspected appendicitis. However the term appendicitis wasn't coined until the American Reginald Fitz published his landmark paper in 1886 'Perforating Inflammation of the Vermiform Appendix; With Special Reference to Its Early Diagnosis and Treatment'.[3]

In 1894, American surgeon Charles McBurney proposed his original approach to the open appendicectomy. Aside from a number of slight modifications, this became the standard approach for more than a century. The first laparoscopic appendicectomy was performed in 1980 by the German gynaecologist Kurt Semm. By the late 1990's the laparoscopic appendicectomy was commonplace alongside the laparoscopic cholecystectomy and remains so.

Surgical anatomy

The vermiform appendix is visible as it buds off from the caecum around the 8th week of development in-utero. The appendicular lumen is narrow although in newborns and infants it is funnel shaped, which may account for the rarity of appendicitis in this age group. Similarly, in older adults the lumen may be obliterated reducing the likelihood of appendicitis.

The base of the appendix is typically found 2.5 cm inferior to the ileocaecal valve, where the three taenia coli (longitudinal ribbons of smooth muscle) converge on the surface of the caecum at the posteromedial aspect. Following the taenia coli intraoperatively is a useful strategy to help locate the appendix. McBurney's point represents the surface anatomy for the base of the appendix, a third of the distance along the line between the anterior superior iliac spine (ASIS) and the umbilicus (Figure 1).

The appendix is usually 5–9 cm in length but can range from 2 cm to 25 cm. It is a relatively mobile structure and may lie in a number of orientations. This can affect the clinical presentation of appendicitis as it irritates adjacent structures (Figure 2). Although uncommon, the caecum may be aberrant through malrotation, situs inversus, adhesions or hypermobility and the appendix found in any quadrant of the abdomen (and the chest).

The appendix receives its blood supply from the appendicular artery, a branch of the ileocolic artery derived from the superior mesenteric artery. The artery travels in the lateral margin of the mesoappendix, a triangular sheet of fatty connective tissue continuous with the inferior part of the ileal mesentery (Figure 2).

Autonomic innervation of the appendix is via the ileocolic branch of the superior mesenteric plexus. Proliferation of these appendicular nerve fibres and up regulation of neuropeptides has been proposed as a non-inflammatory cause of right iliac fossa pain and called neurogenic appendicopathy.[4]

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Please cite this article in press as: Sellars H, Boorman P, Acute appendicitis, Surgery (2017), http://dx.doi.org/10.1016/j.mpsur.2017.06.002

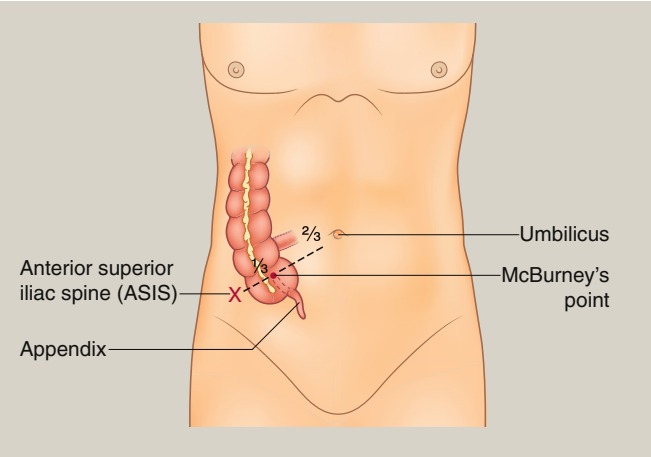

Figure 1 McBurney's point, the surface anatomy representing the base of the appendix

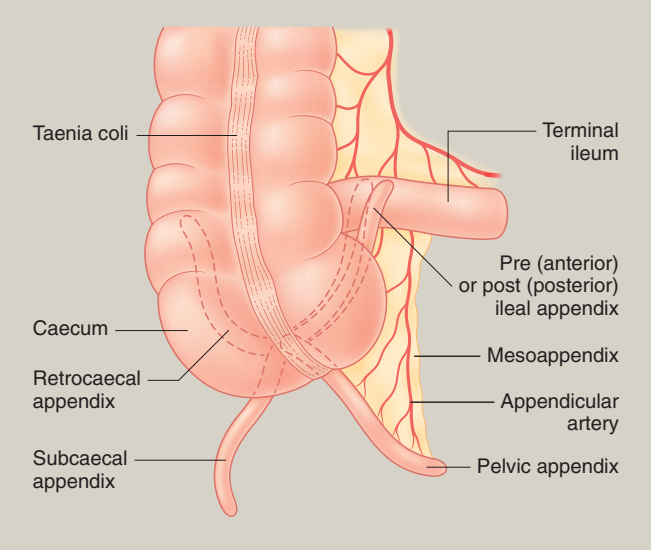

Figure 2 Appendix with its mesoappendix containing the appendicular artery in its lateral edge. The dotted lines depict a number of orientations the appendix is found within the population (pelvic, subcaecal, retrocaecal, pre- and post-ileal)

The histological layers of the appendix are similar to that of the colon. The outer serosal layer is a thin peritoneal covering. A muscular layer, muscularis externa, consists of inner circumferential fibres and a thin external layer of longitudinal fibres. Peristalsis of the appendix enables the expulsion of faeces from the lumen back into the caecum.

The submucosa contains connective and lymphoid tissue, and hyperplasia of the lymphoid tissue typically in response to a viral illness is one mechanism thought to cause appendicitis. The lymph tissue occludes the lumen of the appendix resulting in distension, bacterial overgrowth and infection. This is less likely in older adults as the lymphoid tissue starts to recede around puberty. The innermost lining of the appendix is the mucosa. Mucin is secreted by goblet cells in the mucosa and forms mucous. Prolonged occlusion of the appendicular lumen can result in mucous accumulating in the distal portion forming a mucocele. Mucoceles are usually managed with surgical appendicectomy due to the risk of underlying malignancy.

The appendix was long regarded as a vestigial structure of no real function but recent work suggests this is not the case. Unlike the colon it contains lymphoid tissue and specialized immune cells that secrete immunoglobulins, antimicrobial substances and sample antigens from the intestinal lumen. The appendix appears to have a role in priming the immune response to enteric pathogens in the colon and managing the normal bacterial flora.[5] It is thought the appendix may act as a reservoir for colonic bacteria (microbiome), promoting recolonization following infection with an individual's normal array of gut flora.

Epidemiology

The lifetime incidence for appendicitis is around 7–9% with a slight male preponderance (1.4:1). It may present at any age but is most prevalent between 10 and 30 years old. Risk factors for appendicitis include exposure to smoke, repeated antibiotics, inflammatory bowel disease, cystic fibrosis and a family history of appendicitis. There is significant geographical and seasonal variability; it is more prevalent in rural areas, regions associated with low fibre diets and during the summer months. Women are more likely to undergo an appendicectomy but have higher rates of negative appendicectomies due to the number of potentially mimicking conditions.

Aetiology

The pathogenesis of acute appendicitis remains unclear. Obstruction of the lumen by a faecolith (hard lump of obstructing faeces) or lymphoid tissue is thought to be the most common cause. This results in distension of the appendix, bacterial overgrowth and infection, venous and lymphatic congestion, ulceration and transmural spread of infection through the appendicular wall. The inflammation and infection may result in thrombosis of blood vessels causing ischaemia, necrosis and perforation. This proposed mechanism is challenged by research showing: acute appendicitis can occur in the presence of a patent lumen; faecoliths are equally as common in the population without appendicitis; and intra-luminal pressures are frequently normal despite acute appendicitis.[6]

Faecoliths, lymphoid hyperplasia, foreign bodies, malignancy (predominantly carcinoid and adenocarcinoma), parasitic and fungal infections, inflammatory bowel disease and trauma are recognized causes of appendicitis. The associated infection is multiorganism; *Escherichia coli, Bacteroides* and *Klebsiella* are the most prevalent bacterium cultured. The growth of *Fusobacterium* appears to be associated with a particularly aggressive process and perforated appendicitis.[6] For patients presenting with simple appendicitis, perforation is uncommon even if treatment is delayed for a 24–36 hour period suggesting progression from simple to complex disease is variable.[7]

Following perforation of the appendix intra-abdominal contamination may be contained or generalized. The defect in the appendix may seal itself off against adjacent structures forming an abscess or inflammatory mass (phlegmon). If there is widespread contamination then generalized peritonitis and sepsis develops, a potentially fatal process.

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Presentation

Most diagnoses are made based upon the history, clinical examination and laboratory tests. In all cases there is no value in withholding analgesia for fear of concealing symptoms. Active monitoring is a useful strategy in systemically well patients with equivocal symptoms, serial examinations and blood tests performed over a 24–48 hour period significantly improves sensitivity. Imaging is mostly performed in the UK when there is diagnostic uncertainty and widely employed in children, young women and older adults. Particular vigilance is needed in high-risk groups, extremes of age, immunocompromised, morbidly obese, diabetic and pregnant patients. These groups are more likely to present with subtle and atypical signs in the presence of complex appendicitis.

Diagnostic laparoscopy is an option usually reserved where symptoms persist in patients considered low risk for surgery. It has the advantage of high sensitivity and specificity, particularly in young women and diagnoses such as endometriosis, pelvic inflammatory disease and adhesions. The history, examination and further tests are focused on discriminating between the likely differentials (Table 1).

Presenting history

The primary symptom is abdominal pain, the classical history one of vague peri-umbilical pain migrating to the right iliac fossa in the first 12–24 hours. Pain exacerbated on coughing and moving (or speed bumps) may indicate some degree of peritonism.[8] Patients often describe anorexia, nausea, vomiting and less frequently constipation or diarrhoea. Low-grade pyrexia is common, less so a high grade pyrexia (>39°C) or rigors.

The history should establish the duration, pattern and characteristics of pain and associated symptoms. Normal bowel habits should be explored and any change, such as diarrhoea, constipation, mucous and rectal bleeding. Night sweats, weight loss, lethargy and other systemic signs are also particularly helpful in distinguishing between a discrete acute episode and a chronic or recurring process.

Lower urinary tract symptoms, menstrual and sexual history assists in finding a genitourinary or gynaecological cause for the pain although an inflamed pelvic, subcaecal and post-ileal appendix may cause pelvic, groin or testicular pain and urinary symptoms. In children further questions around peri-natal history, immunization status and recent viral or bacterial illnesses are relevant.

Physical examination

Patients with appendicitis are classically flushed, dehydrated, sometimes ketotic and prefer to remain still. Physiological parameters may show a low-grade fever with tachycardia. Abdominal tenderness in the right iliac fossa and evidence of localised peritonism such as involuntary guarding, rebound tenderness and percussion tenderness are indicative of appendicitis. Other means of testing for peritonism in children include blowing out and sucking in the abdomen or hopping by the bed. In slim patients the appendix or an associated appendiceal mass may be palpable. A number of eponymous tests exist (Table 2).

Testicular examination is essential in young males to look for testicular torsion. Pelvic and rectal examinations are not routinely performed unless there is a suspicion of an alternative diagnosis warranting examination. Ear, nose and throat examination should be performed in younger children; concurrent or recent upper respiratory tract infection and lymphadenopathy may suggest mesenteric adenitis.

Presentation with a 'rigid abdomen', i.e. diffuse abdominal guarding, indicates generalized peritonitis and a perforated gastrointestinal tract. It may be associated with sepsis and shock necessitating immediate resuscitation. A history of preceding right iliac fossa may raise the suspicion of a perforated appendix. Other non-perforated causes of generalized peritonitis include pancreatitis, pelvic inflammatory disease and spontaneous bacterial peritonitis.

Pregnancy

Appendicitis is the most common non-obstetric surgical emergency during pregnancy; there is an incidence of one presentation in every 1500 pregnancies. Fetal loss associated with appendicitis is around 1% up to 36% in the presence of perforation with the greatest risk in the 1st trimester, maternal mortality is very rare.[9,10] There is almost twice the risk of fetal loss during or after a negative appendicectomy but preoperative diagnosis can be very challenging.

List of potential differential diagnoses based upon age and gender

Children	Adults			
	General	Male	Female	Elderly
Mesenteric adenitis	Gastroenteritis	Testicular torsion	Pelvic inflammatory disease	Colonic cancer
Gastroenteritis	Gallstone disease	Epididymo-orchitis	Mittelschmerz pain	Diverticulitis
Constipation	Peptic ulcer		Endometriosis	Bowel obstruction
Pneumonia	Right sided urinary tract disease/UTI		Ectopic pregnancy	Volvulus
Meckel's diverticulum	IBD/terminal iletis		Ruptured/torted ovarian cyst	Ischaemic colitis
Intussusception	Bowel obstruction, adhesions		Torted ovary	Lymphoma
Henoch–Schönlein purpura	Hernias			Aortic/iliac Aneurysm
Porphyria, sickle cell	Acute epiploic appendagitis			
	Rectus sheath haematoma			
	Porphyria, sickle cell			

Table 1

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Description of a number of eponymous signs and symptoms for appendicitis

Test	About
McBurney's sign	Deep tenderness over McBurney's point (1/3rd distance from the anterior superior iliac spine to the umbilicus, Figure 1)
Rovsing's sign	Pain in the right iliac fossa on palpation or percussion of the left iliac fossa indicating peritonism if positive
Obturator sign	Pain on internal rotation of right hip (may indicate inflammation of a pelvic appendix)
Psoas sign	Pain on full extension of the right hip due to the contraction of the psoas (may indicate inflammation of a retrocaecal appendix)
Dunphy's sign	Increased pain in the right iliac fossa with coughing indicating peritonism if positive

Table 2

The gravid uterus displaces the appendix upwards and it is frequently in the right upper quadrant during the later stages of pregnancy. Laboratory tests may be confounded by physiological leucocytosis. Imaging is often needed to assist diagnosis, usually an abdominal ultrasound scan in the first instance and if equivocal magnetic resonance imaging (MRI) is preferred ahead of a computed tomography (CT) scan to minimize the exposure to ionizing radiation. The standard approach in pregnancy is the open appendicectomy; there are concerns over higher rates of foetal loss with laparoscopy although the evidence is conflicting.

Other tests

Urinalysis

A pregnancy test is mandatory in fertile women as an ectopic pregnancy may mimic appendicitis. Urinalysis and culture may support a diagnosis of urinary tract infection or renal colic, although detection of leucocytes and blood in the urine can result from bladder irritation due to an inflamed pelvic appendix.

Laboratory

A rise in inflammatory markers, both white blood count (predominantly neutrophilia) and CRP, are sensitive for appendicitis but not specific. The rise in inflammatory markers is not immediate and patients particularly with a short duration of symptoms can have normal blood tests. Sequential blood tests over a 24-hour period, provides better diagnostic sensitivity.[11]

Scoring

There are a number of diagnostic scores, although they are rarely used in practice. The more widely known are the Alvarado score, Paediatric Appendicitis score and Appendix Inflammatory Response score (Table 3).

Imaging

X-rays are typically done to exclude other differential diagnoses, a chest X-ray may also be performed to look for free subdiaphragmatic gas in a patient with upper abdominal peritonitis. An abdominal X-ray may show an appendicular faecolith but has poor sensitivity and specificity. Women and children with equivocal symptoms often undergo abdominal ultrasound, which has reasonable sensitivity for appendicitis (44–88%) and useful for detecting tubo-ovarian and biliary disease. The limitations of ultrasound include operator dependence, abdominal pain restricting the examination and views impaired by obesity and overlying bowel gas.

CT is highly sensitive and specific for appendicitis, up to 98%, but is disadvantaged by its dose of ionizing radiation. It is widely used in older adults where appendicitis is less common and alternative diagnoses such as malignancy, right-sided diverticulitis or ischaemic colitis should be considered and requires different treatment. Obese and immunocompromised patients and those with inflammatory bowel disease are also groups where CT is often considered. MRI although a lower dose of radiation and being accurate in diagnosing appendicitis is rarely used. Patients may not tolerate the longer duration of scan and enclosed space, it is a more costly imaging modality and there is often limited accessibility.

Management

Patients with suspected appendicitis should be admitted and managed with analgesia, anti-sickness, intravenous fluids and broad-spectrum antibiotics as indicated. Antibiotics are given just prior to surgery or immediately in the event of delays to theatre or sepsis. Concern over *Clostridium difficile* infection and antibiotic resistance has led to increasingly restricted use of cephalosporins; the combination of amoxicillin, metronidazole and gentamicin is an alternative strategy. Perioperative care should involve regular review of the appropriate level of care, fluid status, infection and antibiotics, comorbidities and regular medications and thromboprophylaxis. The minimization of indwelling catheters, early mobilization and nutrition may also improve outcomes.

In simple appendicitis antibiotics are not required following appendicectomy and the patient may go home the same day if well recovered. If there is significant intra-abdominal contamination antibiotics are usually continued intravenously for at least 24–48 hours and a 5-day course completed. If the appendix appears normal intraoperatively most UK surgeons will remove it if no other cause for the right iliac fossa pain is found; 30% of macroscopically normal looking appendixes show signs of inflammation on histopathological examination.[12] This is not a universal strategy. A negative appendicectomy is associated with a complication rate of around 10%. It is not a completely benign procedure and with limited evidence decision-making tends to be at the surgeon's discretion.

A non-operative strategy with antibiotics is favourable in some cases. It is most frequently considered in patients without generalized peritonitis or sepsis who have a significant operative risk, appendicular mass or active inflammatory bowel disease. Immediate surgery in these groups is associated with increased morbidity and potentially avoidable ileocaecal resection. A number of recent studies have compared antibiotics only to the surgical appendicectomy as a first line treatment (predominantly for simple appendicitis) with conflicting recommendations; at

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The scoring methods for three well-known appendicitis scores estimating likelihood of having the disease; Alvarado score, Paediatric Appendicitis score and Appendix Inflammatory Response score

Alvarado scale	Score	Paediatric appendicitis score	Score	Appendix Inflammatory Response	Score
Migration of pain	1	Migration of pain	1		
Anorexia	1	Anorexia	1		
Nausea and/or vomiting	1	Nausea and/or vomiting	1	Vomiting	1
RIF tenderness	2	RIF tenderness	2	RIF tenderness	1
Rebound tenderness	1	Cough/percussion/hopping tenderness RIF	2	Guarding/rebound tenderness	1 (light) 2 (medium) 3 (strong)
Pyrexia	1	Pyrexia	1	Pyrexia >38.5C	1
Raised white blood count ($\times 10^9$/L)	2 (>10)	Raised white blood count ($\times 10^9$/L)	1 (≥10)	Raised white blood count ($\times 10^9$/L)	1 (10–14.9) 2 (≥15.0)
Leukocytes left shift	1	Neutrophilia ($\times 10^9$/L)	1 (>75%)	Neutrophilia ($\times 10^9$/L)	1 (70–84%) 2 (≥85%)
				CRP (mg/L)	1 (10–49) 2 (≥50)
Appendicitis risk	**Total score**		**Total score**		**Total score**
Low risk	0–4		0–5		0–4
High risk	7–10		6–10		9–12

Table 3

present the surgical appendicectomy remains the standard treatment in the UK.[6]

Following a non-operative approach the appendix may be removed electively at a later stage once the infection has resolved, known as an interval appendicectomy. The interval appendicectomy has the advantage of obtaining histology, malignancy is found in 0.9% of appendix specimens.[13] Another advantage is the prevention of recurrent appendicitis or developing chronic inflammation. Where an interval appendicectomy is not performed colonoscopy and CT scanning is indicated in patients over 40 years of age.

Procedure

Laparoscopic appendicectomy is now more common than an open approach in the UK.[1] It is a better diagnostic procedure and other advantages include earlier return to work and fewer surgical site infections. The open appendicectomy is safe and remains widely used, particularly in small children, pregnancy, patients with severe cardiorespiratory disease unable to tolerate the pneumoperitoneum or patients with multiple previous surgeries where port access may be risky due to adhesions tethering bowel to the abdominal wall.

Experimental approaches to the appendicectomy include single incision laparoscopic appendicectomy (SILA) and natural orifice transluminal endoscopic surgery (NOTES) performed by trans-vaginal or trans-gastric routes but neither have demonstrated superiority so far and involve increased complexity.

Open appendicectomy

The patient is prepared supine. Palpating the abdomen under anaesthesia can be helpful, sometimes revealing an appendicular mass or localizing the caecum to guide the incision. The Lanz incision is performed over McBurney's point but relatively transverse in order to lie parallel with the skin crease for cosmesis and extension if necessary. Following dissection of the subcutaneous tissue down to the external oblique aponeurosis, the aponeurosis is incised in line with its fibres. The internal oblique and transversalis muscles are split bluntly, again in the direction of the fibres. Prior to opening, the transversalis fascia and peritoneum are lifted using clips excluding any underlying bowel.

If there is gross contamination then the incision may need to be more extensive. In the case of a normal appendix a systematic examination of the terminal ileum, pelvic organs and large bowel should be performed. It may be necessary to convert to a midline laparotomy to improve visualization and access.

A finger is used to identify the appendix, bluntly dividing any adhesions. The taenia coli on the caecum can be traced to locate the base of the appendix. Once mobile, the appendix and caecum can be delivered through the wound. The tip of the appendix may be difficult to mobilize, particularly with a retrocaecal appendix, in which case a retrograde appendicectomy can be performed, tying off the base of the appendix and mesoappendix first then working distally to free the appendix.

To remove the appendix a window is made in the mesoappendix adjacent to the base. Two clips are placed across the base of the mesoappendix, which is then divided and Vicryl ties applied to ligate the vessels (contains appendicular artery). Haemostasis is checked following removal of the clips. The base of the appendix is crushed with a heavy clip then released and placed 1 cm higher. The appendix is transfixed at the crushed base and divided just above. Burying the appendicular stump using a purse-string suture is still common but the evidence suggests this does not provide any additional benefit.[14] Neither does leaving a drain unless there is a significant abscess cavity. In the presence of free fluid most surgeons will

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perform an intra-peritoneal washout with warm saline and the wound is closed in layers.

Laparoscopic appendectomy

The patient is prepared supine, the surgeon and assistant typically stand on the left side of the patient with the stack including the screen on the opposite side. Ports are commonly placed using the Hassan technique, emptying the bladder reduces the risk of injury during placement. A supra- or infra-umbilical incision is made and the umbilical stalk traced down to the fascia (linea alba). At the stalk fascial junction the peritoneum is tethered, a superficial incision is made and a blunt instrument is gently pushed through the peritoneum. A 10 mm port is inserted and the pneumoperitoneum is established at 12 mmHg. Additional ports are introduced; a common approach is 5 mm ports supra-pubically and in the left iliac fossa allowing triangulation of the instruments to manipulate the appendix (Figure 3). They are placed under direct vision to avoid injury to the viscera and epigastric vessels.

Examination of the abdominal cavity is performed to confirm the diagnosis. The appendix is then mobilized and manipulated with an atraumatic grasper, tilting the table head and left side down can assist in removing small bowel from the right iliac fossa isolating the appendix. Dissection of the mesoappendix from the appendix is performed using diathermy, vessels particularly the appendicular artery can be cauterized or clipped when encountered. When the mesoappendix is dissected off at the base of the appendix an endoloop (loop of suture with a pre-tied knot) is placed over the tip and tightened at the appendix base. A second is positioned just above the first, allowing enough space between the loops to divide the appendix; alternatively stapling devices can be used.

To limit contamination, the appendix is placed in a retrieval bag prior to removal through the umbilical 10 mm port and washout performed if there is contamination. Intraperitoneal gas should be allowed to escape from the abdomen as it contributes to shoulder tip pain on emergence from anaesthetic. At the umbilicus the fascia is usually closed with a J-stitch to reduce the risk of port site hernias prior to skin closure.

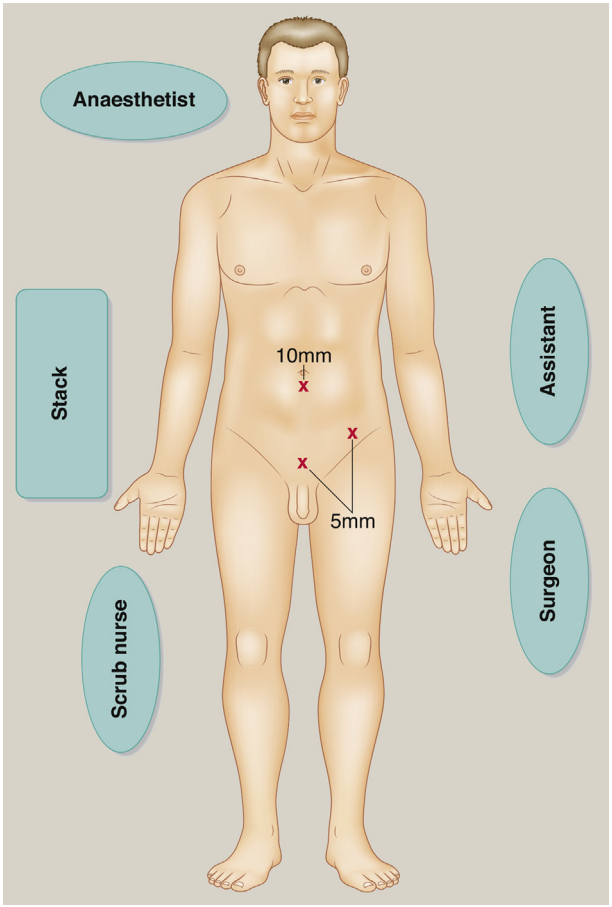

Figure 3 Common laparoscopic set up and port site placement for an appendicectomy

Outcomes

Postoperative complications occur in approximately 12–13% of cases. Surgical site infection is the most common complication, occurring in approximately 3.5% of appendicectomies. Increasing abdominal or pelvic pain, intermittent pyrexia and diarrhoea should raise suspicion of an intra-abdominal abscess, occurring in 3% of appendicectomies.[15] Ultrasound or CT scans are used to detect postoperative collections and they are most frequently found in the pelvis or subphrenic space. Depending on size and location they may be treated with intravenous antibiotics alone or in combination with percutaneous drainage under radiological guidance or surgical drainage.

Less frequent complications include bleeding, ileus, iatrogenic bowel or bladder injury, incisional or port site hernias and adhesions causing small bowel obstruction. Rare complications include stump appendicitis, the inflammation of a long residual appendicular stump that has been left in situ following appendicectomy. Another is a faecal fistula, it occurs when the stump reopens resulting in the leakage of faecal material which discharges through the wound. Most faecal fistulae will resolve with non-operative management.

Conclusion

The classic case is an adolescent or young adult diagnosed based on a typical history, examination and laboratory findings. The mainstay of treatment is either laparoscopic or open appendicectomy. In reality appendicitis can be a challenge to diagnose and manage. Appreciating this and maintaining a level of suspicion is crucial, particularly for those atypical groups at risk of poor outcomes. ◆

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