

Michael Ohene-Yeboah

Introduction

Inguinal hernia is very common worldwide. In Ghana, nearly 11% of men either have a detectable inguinal hernia or a groin scar indicating a previous repair [1]. Large and long-standing inguinal hernias are common in countries in which access to hernia repair surgery is severely limited due to a lack of patient knowledge, trust in the health system or funds to pay for treatment.

This is so in many low- and middle-income countries (LMIC) as in sub-Saharan Africa. In Ghana, the estimated repair rate is 30 per 100,000 population per year [2]. Much higher rates of repair are reported from Europe and North America. This chapter will detail the repair of these types of hernias in LMIC, but the principles presented can be used in any part of the world.

Anatomic Considerations

Inguinal hernia is the more common type of the groin hernias, about 20 times more frequent than the femoral hernia. It occurs in the inguinal canal. The inguinal canal is found in the groin: the part of the anterior abdominal wall that is below the level of anterior superior iliac spines. The inguinal canal is the site of one defect (the internal inguinal ring) and one weak area (the posterior wall of the canal). The internal inguinal ring is a defect in the fascia transversalis and transmits the spermatic cord in the male and the round ligament of the uterus in the female. The posterior wall of the inguinal canal is bereft of muscle and constitutes a design defect in the structure of the abdominal wall. The positive pressure in the abdomen means that abdominal viscera or contents often bulge or protrude through these two areas. The inferior epi-

gastric artery is a useful anatomic landmark in the groin. The internal ring is lateral, and the posterior wall is medial to the artery: we can distinguish the lateral from the medial inguinal hernia.

Inguino-scrotal Hernia

Definition and Classification

There are various gradings or classifications of inguinal hernia. Large inguinal hernias have also been referred to as giant inguinal hernia. In Table 18.1, the clinical classification focuses on aspects of the surgical procedure such as difficulty and duration of operation as well as selection of appropriate anaesthetic technique and level of surgical expertise required.

H3 and H4 hernias that are 20–30 cm or more below the pubic crest are massive (Fig. 18.1). In many LMIC, inguinal hernia repair is often performed by non-surgeon physicians. The value of this classification is that it is clinical and provides for the selection of the level of expertise and the type

Table 18.1 A clinical classification of inguinal hernia according to Kingsnorth [3]

| Grade | Site | Reducibility | Further grading for H3 and H4. Distance from pubic crest in cm |
|-------|------------------------|---|--|
| H1 | Groin hernia | Spontaneously reducible | |
| H2 | Groin hernia | Reducible with gentle manual pressure | |
| H3 | Inguino-scrotal hernia | Reducible after considerable manipulation | H3-10 |
| | | | H3-20 |
| | | | H3-30 |
| H4 | Inguino-scrotal hernia | Irreducible | H4-10 |
| | | | H4-20 |
| | | | H4-30 |

M. Ohene-Yeboah
 Department of Surgery, School of Medicine and Dentistry, College of Health Sciences, University of Ghana, Accra, Ghana
 e-mail: mikeoheneyeboah@yahoo.co.uk



Fig. 18.1 A massive inguino-scrotal hernia

of anaesthesia required for the repair. Experienced surgeons may also find the classification useful when deciding to delegate the procedure to a junior. Massive inguinal hernias are often operated on by very experienced surgeons under general anaesthesia with endotracheal intubation.

Pathology of Massive Inguino-scrotal Hernia

The massive contents inside the hernia sac and outside the abdominal cavity lead to a reduction or contraction of the intra-abdominal cavity over time: loss of domain. Abrupt and forced reduction of the massive contents into the contracted abdominal cavity is associated with an increase intra-abdominal pressure: intra-abdominal hypertension. The associated physiological derangements include a decreased of the venous return, cardiac output and the systemic blood pressure. The respiratory rate and mean airway pressure are both increased, but the tidal volume and the pulmonary compliance are reduced. These changes are mainly due to splinting of the diaphragm.

Clinical Features of the Massive Inguino-scrotal Hernia

These massive hernias often cause difficulty in walking, sitting or lying down, with mobility dramatically restricted. The penis may be buried inside the scrotum causing dribbling of urine over the scrotal skin, which is already congested by lymphatic and venous oedema, leading to excoriation, ulceration and infection. Patients may also complain of difficulty in voiding and recurrent urinary tract infections, especially when the bladder is contained within the hernia sac.

Diagnosis: The diagnosis of massive inguino-scrotal hernia is clinical. Most patients have had a long-standing inguino-scrotal hernia (Fig. 18.1). They tell the doctor that they have a hernia.

Basic investigations to be done include:

Blood for haemoglobin, sickling and haematocrit and urine for sugar, protein and casts

Stool for worms and amoebae

For patients above 40 years or hypertensive:

A chest X-ray

An electrocardiogram

Fasting blood sugar

Liver function tests

Preoperative Assessment

Smoking must stop for at least 4–8 weeks.

Cough must be treated until no sputum.

Excoriations of the scrotal skin must be treated.

Bladder catheterization prevents further excoriation of the scrotal skin.

Medical conditions, such as high blood pressure and diabetes, must be controlled.

Testicular ultrasound can detect testicular atrophy.

A barium enema is safer than a colonoscopy to avoid perforations.

A retrograde cystogram to outline the bladder that may be in the hernia sac.

A CT scan of the hernia mass.

The surgeon has to inform the patient that he may lose a testis and half of the scrotum.

Preoperative Preparations

Massive inguino-scrotal hernia may contain in the hernia sac large parts of the large bowels which may require resection to reduce volume. As part of the preoperative preparations, it is expected that the surgeon arranges to group and save two pints of blood and to cleanse the large bowel for possible

resection and anastomosis. Procedures to increase the intra-abdominal volume require special considerations.

Emergency surgery for strangulated massive inguino-scrotal hernia requires the replacement of fluid losses and correction of any electrolyte deficiencies. A urine output of at least 1 mL per kilogramme body weight in an hour prevents acute renal injury. It is advisable to administer an antibiotic before operating on these emergency cases.

Patient Positioning and Theatre Setup

It is enough to use the standard supine position (Fig. 18.2) with general anaesthesia and endotracheal intubation. This position ensures adequate exposure of the anterior abdominal wall. Piped oxygen is preferred to the use of cylinders. Where there is no piped oxygen, cylinders are used with the usual precautions. The setup must include suction machines, monitors and pulse oximeters that are functioning and have been tested just before use. The overhead operative theatre lights must be functioning, bright and mobile to ensure proper illumination of the operative field. The surgeon may consider transferring the patient if his theatre lacks these basic equipment.

Incision and Access

Once the patient is fully anaesthetized, an attempt is made to reduce the hernia, and many H3 or H4/20–25 cm massive hernias may reduce. In most cases, the standard oblique groin incision that is extended 1 or 2 centimetres beyond the pubic tubercle onto the crest adequately exposes the mass of tissue entering the scrotum. Attention must be paid to bleeding, and careful haemostasis at all stages of the procedure is rewarded with small or no post-operative haematomas. An



Fig. 18.2 Patient in position for the repair of a right massive inguino-scrotal hernia

experienced assistant is needed, and the operative trolley of the scrub nurse must be adequately supplied with a wide range of retractors.

Operative Steps

The aponeurosis of the external oblique muscle is exposed once the superficial epigastric, superficial circumflex iliac and the superficial external pudendal vessels in the subcutaneous layer have been divided and securely tied with number 2/0 vicryl ligatures. The inguinal canal is opened with the standard procedure of dividing the external oblique aponeurosis at the point level with medial crux of the external inguinal ring. An attempt is made to mobilize the spermatic cord in the usual way. This requires considerable gentleness to minimize bleeding. If this fails, the cord coverings are excised at the level of the pubic crest to expose the sac of the hernia. An attempt is made to deliver the contents of the hernia sac onto the operative field. If this procedure fails, the internal ring is extended lateral, and the hernia is reduced. The anaesthetist is then requested to assess the respiration. For most massive hernias, there is a significant reduction in the lung volumes and breathing capacity. This is an indication to perform a volume reduction procedure.

The greater omentum is a regular content of the sac of a massive inguino-scrotal hernia; an omentectomy of variable extent may make it possible to reduce the hernia and yet preserve adequate respiration. Other volume or mass reduction procedures that may be considered at this stage include colectomy of variable extent or some other form of bowel resection as the case may be. There is always the option of a second incision: a lower midline abdominal incision. Many junior surgeons find that this incision makes it easy to return the contents of the sac into the abdominal cavity. It also allows the performance of a major volume reducing procedure such as a hemi-colectomy without difficulty. This second incision may be optional in elective repair, but in emergency situations and in the hands of an inexperienced operator, it is so useful as to be considered mandatory. Once the contents of the sac are in the abdomen, the sac is divided at some point proximal to the fundus and closed securely with a vicryl number 00 or 1 or even 2 ligature. Again careful haemostasis is advised. The distal sac must not be closed.

The dissection of the posterior wall can now start with the reidentification of the iliohypogastric, ilioinguinal and genital branch of the genitofemoral nerves. In these massive hernias, this step may not be easy. The anatomic situation and the attenuated condition of the tissues in massive long-standing inguino-scrotal hernias provide an absolute indication for the mesh or the Lichtenstein procedure. Tissue repair techniques are contraindicated in this situation. The operator must clearly demonstrate the anatomic landmarks for mesh

insertion: the internal ring, the conjoint tendon, the inguinal ligament and the pubic tubercle. A polypropylene mesh of standard and appropriate size is sutured into place with number 2/0 Prolene sutures [4].

There are other techniques apart from bowel resection that may be used when there is evidence of loss of domain to prevent intra-abdominal hypertension. Preoperative progressive pneumoperitoneum is often quoted in the literature [5]. The drawback here is that the pneumoperitoneum causes expansion of the thin hernia sac rather than the contracted abdominal cavity. It requires prolonged preoperative hospitalization but has a high failure rate.

There are plastic surgery techniques or procedures such as rotation of viable tissue with extended abdominal wall reconstruction by the use of mesh [6]. These procedures may be considered in the case of severe weight loss associated with extreme contraction of the abdominal cavity. A new technique is the open or laparoscopic component separation to increase the capacity of the abdominal cavity.

Closure

Provided there is no increased intra-abdominal pressure, the groin and the lower abdominal incisions are closed in the standard manner. The operator must always leave a drain of any kind in the scrotum. Redundant skin will recover once there is no post-op infection. However, extensive redundant flabby skin is best excised.

Post-operative Management

These patients do not require continuous monitoring as in an ICU. In the immediate post-operative hours, close monitoring of the blood pressure and the urine output in a standard recovery ward are critical to reveal very early any signs of intra-abdominal hypertension. Nasogastric decom-

pression must continue if there was a bowel resection until the ileus is over. A clinical chest examination is useful to detect atelectasis and other complications of prolonged anaesthesia. A scrotal support may facilitate early ambulation. The patients can be discharged within the week and reviewed at 2 weeks and 1-year post-operative.

Tips and Pitfalls

The surgeon needs to arrange to start the operation early. A second case on the list is ill-advised. If your assistant failed to pass a bladder catheter, then the surgeon must do it. Lack of a catheter significantly increases the risk of bladder injury. If the groin incision does not expose the pubic tubercle, it is not possible to identify the anatomic landmarks. To rush is to court disaster: arrange for ample time. Rough handling of the tissues can result in large, unsightly and embarrassing post-operative scrotal oedema and haematoma. If the patient is pale post-operative, do not hesitate to transfuse at least two pints of blood.

References

1. Ohene-Yeboah M, Beard J, Frimpong-Twumasi B, Koranteng A, Mensah S. Prevalence of inguinal hernia in adult men in the Ashanti region of Ghana. *World J Surg.* 2016;40:806–12.
2. Beard JH, Oresanya LB, Ohene-Yeboah M, Dicker RA, Harris HW. Characterizing the global burden of surgical disease: a method to estimate inguinal hernia epidemiology in Ghana. *World J Surg.* 2013;37(3):498–503.
3. Kingsnorth AN. A clinical classification for patients with inguinal hernia. *Hernia.* 2004;8:283–4.
4. Sakorafas GH, Halikias I, Nissotakis C, Kotsifopoulos N, Stavrou A, Antonopoulos C, Kassaras GA. Open tension free repair of inguinal hernias; the Lichtenstein technique. *BMC Surg.* 2001;1:3.
5. Mayagotia JC, Suarez D, Arenas JC, Diaz de Leon V. Preoperative progressive pneumoperitoneum in patients with abdominal wall hernias. *Hernia.* 2006;10(3):213–7.
6. Mehendale FV, Taams KO, Kingsnorth AN. Repair of a Giant inguino-scrotal hernia. *Br J Plast Surg.* 2000;53(6):525–9.