Inguinal Hernia Repair in the Elderly

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In 2050, the population aged 65 and over in the United States is projected to be 83.7 million, double its estimated number of 43.1 million in 2012 [1]. This demographic shift in the population will have its implications in terms of a higher proportion of the elderly undergoing surgery or other interventional procedures. Inguinal hernia repair is one of the most common surgical treatments performed worldwide [2]. Aging promotes physiological and pathological changes in the elderly that leads to increased prevalence of inguinal hernia (IH) in them as compared to the younger population. Decreased collagen synthesis, weak abdominal musculature, and increased intraabdominal pressures as a result of chronic prostate disorders or pelvic floor weakening are few of the common causes [3]. Surgical intervention is offered for inguinal pain and discomfort interfering with the quality of life (QOL) and to prevent emergency surgery in case of incarceration and/or strangulation, which is associated with very high rates of morbidity and mortality [4, 5]. The elderly population has a higher burden of comorbidities, and they tend to present late to seek medical care. Some studies have shown that 40% of inguinal and femoral hernia repairs in patients above 65 years of age are performed for incarceration or bowel obstruction [3, 6].

Inguinal Hernia in the Elderly Presents Differently from the Non-elderly

While considering the acuity of presentation, it is noteworthy that the elderly population is more likely to present with complicated inguinal hernia (incarceration or strangulation) as compared to young patients [7]. The overall risk of incarceration and strangulation approaches is up to 40% [3].

Studies have shown that time from diagnosis to inguinal hernia repair is usually higher in the elderly as compared to young patients [8]. This disparity is an active area of future research and intervention. The role of physicians practicing in the community is of paramount importance in early detection and post-operative care of the elderly undergoing IH repair [9].

Anatomically inguinal hernia is divided into two common types, indirect inguinal hernia when

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the hernial contents travel through the inguinal canal and exit via the superficial inguinal ring. Protrusion of the hernial contents through the weakened floor of the inguinal canal is known as direct inguinal hernia. An indirect hernia is more common in the young and direct hernia in the elderly [10].

The elderly generally present with larger indirect inguinal hernia than young adults. In the case of large indirect hernia, an acquired defect of the transversalis fascia is always present. Direct inguinal hernias are more often bilateral, and its occurrence is closely related to age [11]. These large hernias may contain large or small bowel (please refer to Figs. 1.3 and 1.5 in Chap. 1, as well as Fig. 16.1) and often are bilateral (Fig. 16.2), and are combined with umbilical hernia (Fig. 16.2).

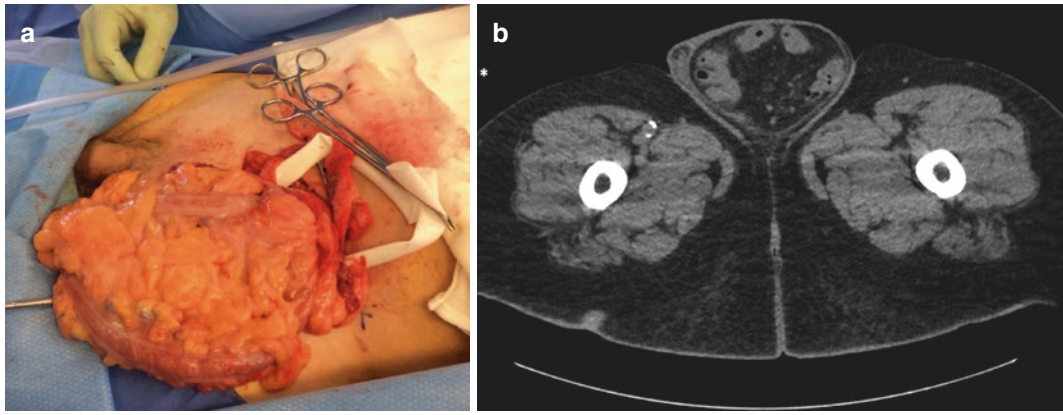

Fig. 16.1 (**a**) 73-year-old male with left incarcerated inguinal hernia containing sigmoid colon. (**b**) CT scan of the same patient with incarcerated sigmoid colon in scrotum (∗)

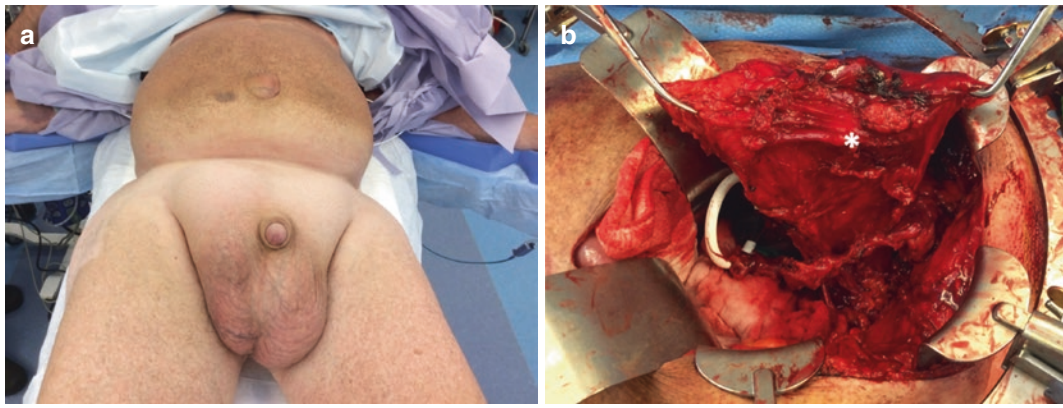

Fig. 16.2 (**a**) 61-year-old male with bilateral inguinal hernias and concurrent umbilical hernia. (**b**) Herniated bladder of the same patient with the left ureter (dilated) as it inserts into the herniated bladder (∗). (**c**) CT scan of the same patient illustrating bilateral inguinal hernias (∗)

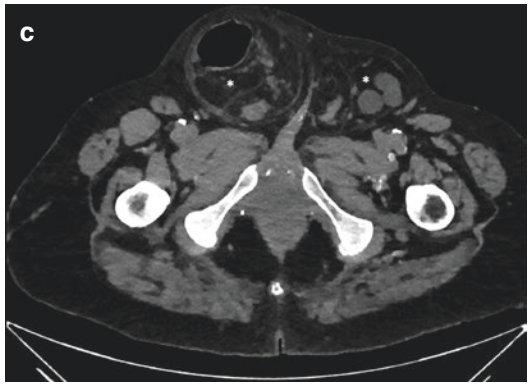

Fig. 16.2 (Continued)

A very practical issue that we surgeons face routinely in our day-to-day surgical practice of IH repair is the presence of a combined hernia in the elderly (Fig. 16.3). The pathogenesis of combined hernia stems from the fact that it is a progressive disease caused by chronic compressive structural damage due to long-term degenerative changes and hence more common in the elderly [12]. The simultaneous presence of hernial contents in different anatomic compartments of the inguinal area may lead to increased chances of early recurrence and morbidity if the surgical

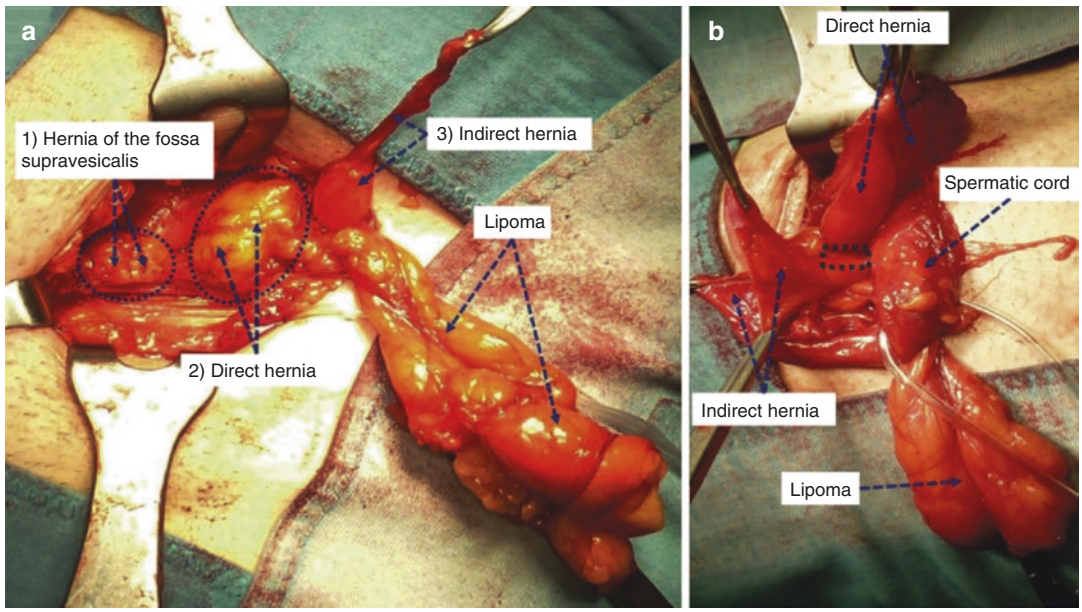

Fig. 16.3 (**a**) Tricomponent multiple ipsilateral herniae composed by a hernia of the fossa supravesicalis, a direct hernia and indirect hernia with a lipoma. (**b**) Double ipsilateral inguinal hernia composed by one direct and one indirect hernia (with opened sac). The medial aspect of the internal ring and the small portion of the back wall containing the inferior epigastric vessels (blue rectangle) divide the two protrusions. (From Amato et al. [12]. CC BY NC ND, license number: 4587921038730)

exposure is compromised due to faulty technique or lack of awareness.

Choice of Anesthesia and Setting of Inguinal Surgery

While there is an entire chapter dedicated to anesthesia in the elderly, in this chapter we briefly describe some of the techniques used for inguinal hernia surgery. Aging is linked to adverse postoperative outcomes affecting various organ systems and deterioration of cognitive function in elderly surgical patients [13]. The solution to prevent adverse postoperative outcomes is to have better integrated perioperative care. The aim of perioperative care is to improve the likelihood of very elderly surgical patients returning to their same pre-morbid status.

While considering the type of anesthesia, European Hernia Society (EHS) recommends that elective open (anterior) inguinal hernia surgery can be safely and effectively performed under local anesthesia (LA) in the elderly (Grade A recommendation, level of evidence Ib) [14]. All elderly patients should have long-acting local anesthetic infiltration preoperatively for better postoperative pain control. General anesthesia (GA) with short-acting agents along with local infiltration with long-acting LA anesthesia is a valid alternative to surgery under LA. The obvious indications for GA in the elderly are incarceration, obstruction, or strangulation.

In a three-arm multicenter randomized trial by Nordin et al., 616 patients at ten hospitals were randomly assigned to local, regional, or general anesthesia in patients undergoing groin hernia surgery. Patients in LA arm had substantial advantages in terms of shorter duration of admission, less postoperative pain, and fewer micturition difficulties [15]. Inguinal hernia repair with local anesthesia is quite safe and results in a good success rate in elderly patients despite a higher rate of comorbidity [16].

Multimodal analgesia combines different drugs with the aim of reducing doses and minimizing side effects of analgesics. Figure 16.4 depicts an effective way to control postoperative pain. All patients get long-acting LA and oral Tylenol to begin with. The slowly escalating doses of tramadol followed by opioids (in minimum possible concentration) are added. In a study by Seib et al., on the association between frailty in the elderly and outcomes after ambulatory surgery, the two important factors associated with decreased odds of complications were the use of local anesthesia and monitored anesthesia care [17]. With the shifting demographics of the aging population, the number of elderly patients requiring surgical procedures is increasing [18]. This has been a strong driving force in tilting the favor toward the ambulatory surgery centers performing the higher number of groin hernia repairs. Ambulatory surgery improves the quality of care and life with low morbidity [19]. A randomized control trial (RCT) comparing ambulatory care vs. inpatient care in elderly patients (excluding ASA IV and unstable ASA III) undergoing open inguinal hernia repair (Lichtenstein or repair with Proline hernia system) under local anesthesia showed no significant differences between both groups in the first 2 weeks postoperatively. Patients in the LA group had a high satisfaction rate and no readmissions [20]. Surgeons have pushed the boundaries little further; elective inguinal hernia repair in the elderly with

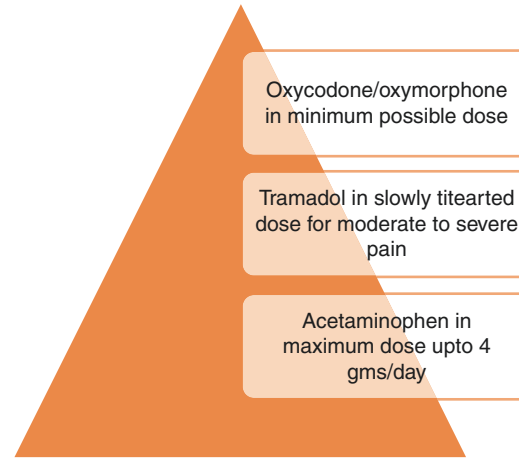

Fig. 16.4 Multimodal analgesia with escalation to more potent drugs

significant comorbidities under LA has a good outcome [21].

Both open tension-free repairs and endoscopic techniques can be safely performed at daycare centers. The published series showed that other surgical and anesthesiologic techniques can also be effectively used as day surgery [14].

Is Surgical Technique Any Different in the Elderly?

Table 16.1 shows the various surgical techniques employed based on patient and surgeon's preference. The inherent steps in a particular surgical technique essentially remain the same in the elderly as well as the non-elderly. However, surgical intricacies might differ. As pointed earlier, the readers must keep in mind that "hernia is a progressive disease, which always continues to evolve" so the elderly have more propensity to present with a combined hernia, which has both direct and indirect components; this simply means that anatomy of the inguinal canal is distorted in the elderly [12]. Surgeons must be aware of the burden of comorbidity and frailty in elderly patients. The goal of IH surgery is a quick functional recovery after the operation using the "tension-free" technique and whenever possible under local anesthesia [22]. The mesh repair seems to be more prudent and strongly advocated in the elderly in elective cases than tissue repairs (Grade A recommendation) [14].

Table 16.1 Surgical technique of inguinal hernia repair

Tension-free prosthetic repairs	Technique
Anterior repair	Lichtenstein repair and its modifications
	Patch and plug repairs
	Double-layer devices (Proline Hernia system)
Posterior repair	(a) Open techniques via inguinal incision
	(b) Stoppa's repair
Laparoscopic repairs	Transabdominal preperitoneal (TAPP)
Endoscopic repairs	Total extraperitoneal (TEP)
Tissue-suture repairs	Bassini's repair
	Shouldice technique
	Desarda's technique
	Marcy repair

As mentioned in Table 16.1, anterior repair, also known as pre-muscular repair, strengthens the posterior wall of the inguinal canal. The primary goal of the posterior repair, also known as preperitoneal repair is to strengthen the entire myopectineal orifice [23]. Open anterior techniques are well established in the elderly; however, posterior repair necessitates general anesthesia (which might be unsuitable for the elderly with cardiopulmonary disorders).

The laparoscopic approach is safe in carefully selected elderly patients. In a retrospective analysis on 3203 cases (3847 hernias) by Zirui et al., who underwent LIHR, there were no significant differences in the recurrence rate and overall complication rate between the two arms ($P > 0.05$) [24]. The other two retrospective studies comparing laparoscopic approach vs. open approach in octogenarians concluded that laparoscopic inguinal hernia repair can be performed as a safe alternative to open repair with comparable rates of morbidity and mortality [25, 26]. In a prospective study by Vigneswaran et al. which aimed to analyze patient-centered outcomes for open and laparoscopic hernia repairs in the elderly concluded that laparoscopic inguinal hernia repair is safe and effective in the elderly with no major morbidities or mortalities. Although they are at greater risk for postoperative seroma, urinary retention, and octogenarians are at greater risk for readmission [27]. In essence, laparoscopic inguinal hernia repair can be safely performed in the elderly, but when it comes to safety, "open repair under local anesthesia" is still considered the gold standard in elective settings with which all techniques are compared. Emerging literature suggests that robotic inguinal hernia repairs are an option [28] and may be performed safely in the elderly [29]; however, the cost is still very prohibitive for most countries around the world.

It is well established that emergency hernia repair rates for incarceration, obstruction, and strangulation increase exponentially with the

age in patients once they cross more than 50 years of their life [5]. Males predominate among the patients up to 75 years of age, while females prevail in the later age after 75 [30]. An emergency operation carries a substantial mortality risk. In the largest prospective study published in Sweden, the mortality was 7%, and it increased seven-fold after emergency operations and 20-fold if bowel resection was undertaken [31]. The mortality in the elderly population after emergency hernia repair is even higher. The surgical principles for the management of acute presentation in the elderly remain the same, but the delay in treatment has higher mortality and poor outcomes in the elderly as compared to a younger cohort.

Current Guidelines of Inguinal Hernia Management in the Elderly and Conclusions

There are no dedicated guidelines available for IH management in the elderly. There are three prominent guidelines on IH issued by hernia societies: the European Hernia Society guidelines (EHS), HerniaSurge Group (international guidelines for groin hernia management published by American Hernia Society, 2018), and International Endo Hernia Society guidelines (IEHS, published in 2011) covering laparo-endoscopic groin hernia repair [14, 32, 33]. The composite recommendations are presented here.

Indications for Treatment

Minimally symptomatic or asymptomatic inguinal hernia in men can be managed by the watchful waiting strategy (Grade A). It is recommended that symptomatic inguinal hernias be treated surgically (Grade D). The strangulated hernias should be operated on urgently (Grade D). In patients with a femoral hernia, early surgery should be performed, even if the symptoms are vague or absent. For recurrent IHs, use the opposite approach (e.g., for recurrence after anterior repair use a posterior technique, and vice versa is recommended [14].

Type of Anesthesia and Setting of Surgery

Most of the open inguinal hernia repairs can be done safely under local anesthesia at the daycare surgery center. Most of the laparo-endoscopic hernia repairs can also be safely performed at daycare centers (Level 2B, grade B).

The use of spinal anesthesia, especially, or long-acting anesthetic agents, should be avoided. General anesthesia with short-acting agents and with local infiltration anesthesia for prolonged pain control is strongly recommended (Grade B recommendation) [14].

Prophylactic Antibiotics

In open surgery, they are not recommended in low-risk patients. They are also not recommended in laparo-endoscopic surgery. In the presence of recurrence, advanced age, immunosuppressive conditions, expected long operating times and use of drains, antibiotic prophylaxis should be considered (Grade C recommendation).

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