CHAPTER – 15

Frailty and Laparoscopic Surgery

Background:

As there is an increase in world's aging populations, emergency abdominal surgery for acute abdomen in the elderly has become a worldwide problem. The profile of emergency abdominal surgery has changed as a result of demographic shifts, with common causes of acute abdomen among the elderly including acute cholecystitis, incarcerated hernia, intestinal blockage, and appendicitis. Recovery from surgery is generally difficult in older patients, resulting in lengthier hospital stays than in younger people. In the emergency room, laparoscopy is well-established and has a variety of advantages over open surgery, including lower postoperative discomfort, hospital stay, and complication rates.While laparoscopic surgery for acute diverticulitis has grown more common, laparotomy is still utilised in roughly 70% of cases for other disorders such as small intestinal blockage and perforated peptic ulcer. Furthermore, despite the critical need for information on surgical treatment of acute abdomen in the elderly, there is still a paucity of evidence in this subject. [1]

Since the invention of diagnostic laparoscopy in the 1960s, laparoscopic surgery has been successfully employed for abdominal surgeries. At the beginning of the 1980s, the pioneers of laparoscopic surgery, Semm K and Muehe E, moved it from a diagnostic to a surgical operation, and it has since become a widely used method for a variety of purposes.[2] The treatment has established the gold standard for a variety of organ systems, including the reproductive (especially gynaecological) and digestive systems (as for cholecystectomy). Laparoscopic surgery has become safe and

viable in a variety of medical sectors thanks to significant advancements in surgical training, as well as breakthroughs in instruments, imaging, and surgical procedures.[3]

Due to concerns about prolonged surgical time, higher technical challenge, increased pneumoperitoneum-related physiologic demands, and patient posture, the utility of laparoscopic surgery in the medically unfit patient has been questioned. There is considerable debate on the safety of minimally invasive abdominal surgery in elderly patients, as some studies have found an increased risk of problems, while others have found laparoscopic surgery to be a safe treatment even in the elderly. As a result, whether open or laparoscopic colorectal surgery is indicated in frail older patients is still debatable.[3]

The impact of frailty on outcomes after laparoscopic surgery is poorly understood. It's unclear whether the growing technical and physiological demands of laparoscopic surgery offset the advantages of a minimally invasive procedure. The purpose of this chapter is to discuss the impact of frailty on laparoscopic operations and the surgical outcomes.

Evidence based assessment of impact of frailty on laparoscopic surgery outcome:

Palmer et al documented the prevalence of frailty in older adults undergoing emergency laparotomy and explored the relationships between frailty and postoperative morbidity and mortality.According to the findings, one-fifth of elderly persons who require an emergency laparotomy were frail. Frailty was linked to a higher risk of postoperative mortality and morbidity, and it is independent of age. To improve decision-making and the development of novel postoperative methods, the authors suggested that frailty score should be integrated into acute surgical assessment practice. [4]

The role of laparoscopy in fragile patients undergoing colorectal surgery for colorectal cancer was investigated by Ho B and co-authors.[5] An examination of the American College of Surgeons National Surgical Quality Improvement Program

database from 2011 to 2014 was conducted to identify frail patients who underwent colorectal cancer resection (using a frailty index). 30-day mortality and Clavien–Dindo grade IV (CD-IV) sequelae were assessed using univariable and multivariable models. There were 52,087 colorectal cancer patients identified, with frailty accounting for 2.63% (index score 5). Patients beyond the age of 85 were labelled frail 6.8% of the time, accounting for 24.5% of all frail patients. In 32.9% and 53.1% of patients with and without frailty, respectively, laparoscopic surgery was conducted. Patients with fragility were less likely to die within 30 days of surgery if they were younger, had the procedure done on their own, or had it done laparoscopically. On multivariate analysis, laparoscopy and elective surgery were linked to greater perioperative survival, whereas 30-day mortality was linked to older age, male sex, and tobacco use.

The study concluded that Clavien–Dindo grade IV problems were shown to be less common with laparoscopy and a lower BMI.Although laparoscopy is less common in the elderly, this study found that individuals over the age of 85 who had elective surgery had superior perioperative results.[5]

Mosquera C and co-authors did a retrospective study to understand the influence of frailty on postoperative outcomes for laparoscopic and open colectomy.[6]Patients undergoing colon resection [open colectomy (OC) and laparoscopic colectomy (LC)] were studied using data from the National Surgical Quality Improvement Program (2005-2012).

A total of 94811 individuals were identified, with the majority undergoing OC (58.7%), being white (76.9%), and not being fragile (44.8%). Longer lengths of stay (LOS) occurred in 4.7% of cases, with a 2.28% 30-day death rate.[6] Patients who had OC were older and had a higher ASA score than those who did not. Patients undergoing OC had considerably higher rates of complications, longer LOS, and mortality. For all frailty ratings, OC had a greater risk of death and comorbidities than LC, as well as an increase in absolute mortality with increasing frailty.

The study concluded that LC has been linked to better outcomes. Despite the fact that non-frail people have a higher risk of death, mortality rates rise as frailty increases. [6]

A 2-year follow-up examination of frail elderly patients treated with immediate surgical intervention was undertaken by Zese M et al.[7] The study included 120 individuals over the age of 65 who had surgical abdominal crises. The study took into account co morbidities, operation type (laparoscopy, laparotomy, or converted), frailty score, mortality, and complications at 30 days and 2 years. They came to the conclusion that death was highly dependent on the type of surgery (laparotomy vs. laparoscopy), recovery difficulties, and a lower Fried frailty criterion score on average.

The study's long-term follow-up can be considered a useful tool for highlighting a safer surgical strategy in frail elderly patients, such as laparoscopy. In emergency cases, the authors believed the laparoscopic method is possible, with similar or better outcomes than laparotomy, especially in frail elderly patients.[7]

As a less intrusive procedure, laparoscopic gastrectomy (LG) may offer more clinical benefits for elderly patients; nevertheless, there is still no evidence to support this claim. In a countrywide prospective cohort study, Honda M et al looked at the surgical outcomes of elderly patients. A total of 8827 patients were enrolled in the study. 161 (10.9%) of patients who had an open gastrectomy (OG) and 98 (7.2%) of patients who had a laparoscopic gastrectomy (LG) experienced grade 3 problems. [8]

The authors demonstrated that laparoscopic surgery was not an independent risk factor after correcting for confounding factors. In comparison to LG, OG was linked with a considerably longer median length of postoperative stay (16 versus 12 days). Other postoperative comorbidities were not found to be significantly different.The study demonstrated the safety of LG in elderly patients. Furthermore, the authors concluded that LG shortened the length of postoperative hospital stay.[8]

Clinical implications of frailty for Clinicians:

All older persons undergoing an emergency laparotomy should have their frailty status evaluated prior to surgery to help with complex decision-making and perioperative care. Few of the existing prognostic scores are simple to grasp for the patient and their family, which could make shared decision-making difficult. [9, 10]Frailty, on the other hand, is a concept that many people are familiar with. This foundational knowledge could help patients and their families better comprehend not only the chances of dying during surgery, but also the dangers of substantial life-altering consequences and a lengthy and difficult recovery. The fragility score could lead to tailored perioperative paths once the decision to have surgery has been made. Patients with Clinical Frailty Score (CFS) 4–7, for example, had the highest chance of death, therefore early participation and assessment by critical care might help with postoperative planning. During the first several days after surgery, critical care and surgeons focus on on-going treatment for the initial pathology (example: sepsis, renal support, ventilator support, wound management).

This could be improved by collaborating with geriatricians and using the Comprehensive geriatric assessment (CGA), with the goal of preventing frailty-related complications, such as protecting muscle mass[11, 12] (early mobility or movement whether on or off a ventilator); maintaining respiratory capacity (timed regular physiotherapy); and maintaining nutrition and energy balance (parental or enteral). [13, 14] In contrast, a patient with CFS 3 may only need to be in critical care for a brief time before continuing with focused rehabilitation recommended by a hospitalist or geriatrician and overseen by surgical ward nurses. This modified emergency laparotomy CGA allows for tailored training in surgical and geriatric curricula, allowing for multidisciplinary perioperative care.[12,15]

Figure 1: Scatterplot displaying the relationship between frailty and 90-day mortality in older adults undergoing emergency laparotomy.

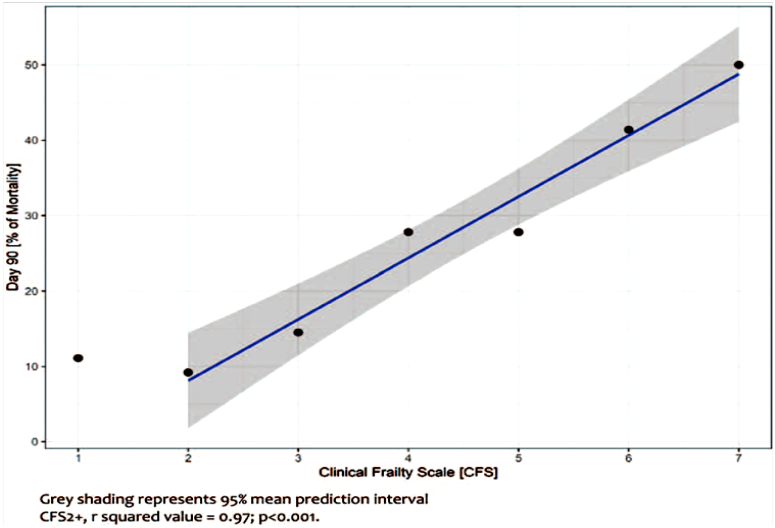

Image source: Parmar KL, Law J, Carter B, Hewitt J, Boyle JM, Casey P, et al. Frailty in older patients undergoing emergency laparotomy: results from the UK observational emergency laparotomy and frailty (ELF) study. Ann Surgery. 2021;273(4):709-18.[4]

Summary:

Frailty is evident in 20% of older persons who have an emergency laparotomy, regardless of age.[4] Frailty raises the risk of postoperative mortality and morbidity in the older adult. Several studies back the inclusion of preoperative frailty assessment and emphasise the urgent need to find novel postoperative treatments to enhance outcomes for this high-risk category of patients. Furthermore, long-term randomised clinical trials are needed to prove that laparoscopic surgery is superior to open surgery for treating abdominal problems.

References:

1. Agresta F, Podda M, Campanile FC, Bergamini C, Anania G. Emergency laparoscopic surgery in the elderly and frail patient.Springer Nature, Switzerland AG, 2021.

2. Reynolds W Jr. The first laparoscopic cholecystectomy.JSLS. 2001; 5(1):89-94.

3. Buia A, Stockhausen F, Hanisch E. Laparoscopic surgery: a qualified systematic review. World J Methodol. 2015;5(4):238.

4. Parmar KL, Law J, Carter B, Hewitt J, Boyle JM, Casey P, et al. Frailty in older patients undergoing emergency laparotomy: results from the UK observational emergency laparotomy and frailty (ELF) study. Ann Surgery. 2021;273(4):709-18.

5. Ho B, Lewis A, Paz IB. Laparoscopy can safely be performed in frail patients undergoing colon resection for cancer. The American Surgeon. 2017;83(10):1179-83.

6. Mosquera C, Spaniolas K, Fitzgerald TL. Impact of frailty on approach to colonic resection: Laparoscopy vs open surgery. World J Gastroenterol. 2016;22(43):9544.

7. Zese M, Finotti E, Cestaro G, Cavallo F, Prando D, Gobbi T, Zese R, Di Saverio S, Agresta F. Emergency Surgery in the Elderly: Could Laparoscopy Be Useful in Frailty? A Single-Center Prospective 2-Year Follow-Up in 120 Consecutive Patients. Surgeries. 2021;2(1):119-27.

8. Honda M, Kumamaru H, Etoh T, Miyata H, Yamashita Y, Yoshida K, Kodera Y, Kakeji Y, Inomata M, Konno H, Seto Y. Surgical risk and benefits of laparoscopic surgery for elderly patients with gastric cancer: a multicenter prospective cohort study. Gastric Cancer. 2019;22(4):845-52.

9. Smith AK, Williams BA, Lo B. Discussing overall prognosis with the very elderly. N Engl J Med. 2011;365:2149–2151.

10. Reaslising Realistic Medicine. Catherine Calderwood, Chief Medical Officer, Scotland. Available at: https://beta.gov.scot/news/realising-realistic-medicine/.Accessed May 22, 2019.

11. The National Emergency Laparotomy Audit (NELA). Available at: www.nela.org.uk.Accessed May 22, 2019.

12. Pearce L, Bunni J, McCarthy K, et al. Surgery in the older person:

training needs for the provision of multidisciplinary care. Ann R Coll Surg Eng. 2016;98:367–370.

13. The High-Risk general Surgical Patient: Raising the Standard. The Royal College of Surgeons of England Updated Recommendations on the Perioperative Care of the High-Risk General Surgical Patient, 2018. Available at: https://www.rcseng.ac.uk/news-and-events/media-centre/press-releases/highrisk- general-surgical/.Accessed May 22, 2019.

14. Oliver DM, Bassett MG, Poulton TE, et al. Organisational factors and mortality after an emergency laparotomy: multi-level analysis of 39 903 National Emergency Laparotyotmy Audit patients. BJA. 2018;1346–1356.

15. Barbas AS, Haney JC, Henry BV, et al. Development and implementation of a formalized geriatric surgery curriculum for general surgery residents. Gerontol Geriatr Educ. 2014;35:380–394.