Technique and outcome of day case laparoscopic hiatus hernia surgery for small and large hernias: a five-year retrospective review from a high-volume UK centre

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ABSTRACT

INTRODUCTION Laparoscopic anti-reflux surgery is the standard surgical treatment for gastro-oesophageal reflux disease in patients for who long-term pharmacotherapy is intolerable or ineffective. Advances in anaesthesia and minimally invasive surgery have led to day case treatment being adopted by some centres. The objective of this study is to describe our day case pathway and peri- and postoperative outcomes.

MATERIALS AND METHODS This is a single centre, retrospective case series review of a prospectively collected database from October 2014 to August 2019 performed in a tertiary centre for upper gastrointestinal surgery. Data collected included demographics, comorbidities, indications, complications, length of stay and readmission.

RESULTS A total of 362 patients underwent laparoscopic anti-reflux surgery with or without hiatus hernia repair of up to 10cm, with day case rates of 59%. Unplanned admission following day surgery was 5.1% (13/225) and 30-day readmission was 2.2% (8/362); 90.6% of patients remained in hospital for less than 24 hours. There was one intraoperative complication and one patient required revisional surgery within 30 days. The rate of all postoperative complications was 1.38% (5/362) with one postoperative mortality.

DISCUSSION The inclusion of larger hernias is unusual, as most studies limit size to 5cm or less. Our results show the safety and feasibility of the procedure even when applied to hiatus hernias up to 10cm. Success was multifactorial and based on standardisation of procedures and support from dedicated specialist nursing staff.

CONCLUSION Laparoscopic anti-reflux surgery can be performed safely as a day case procedure even in larger hiatus hernias, with a dedicated care pathway and specialist nurse practitioners to support it.

KEYWORDS

Day case – Anti-reflux – Hiatus hernia – Reflux

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Introduction

Gastro-oesophageal reflux disease is a common condition in the western world, with 10–20% of adults suffering weekly symptoms posing a substantial financial burden to the NHS.^{1–4} Laparoscopic anti-reflux surgery (LARS) is now the standard surgical intervention recommended by the National Institute for Health Care and Clinical Excellence in patients with a confirmed diagnosis of acid reflux responsive to acid suppression therapy who cannot tolerate or do not wish to continue long-term pharmacotherapy.⁵

Day surgery is now recommended as the norm for any patient having elective surgery in the NHS; there are considerable associated financial savings.⁶ It improves

patients postoperative recovery; reducing length of stay and associated risks of hospital acquired infections and venous thromboembolism.¹¹ Multiple studies have been published over the past 20 years that have demonstrated the safety and feasibility of day case LARS. A 2011 systematic review of 1459 patients who underwent day case LARS from 15 non-randomised studies showed low rates of morbidity, repeat surgery and readmission.⁸ Despite these rates, only 15.1% of LARS performed in England during 2018 were day cases.⁹

We describe our centre's protocol and outcomes for day case laparoscopic fundoplication, which has led to continued improvement in our day case rates.¹⁰

Materials and methods

This was a single-centre, retrospective case series review performed in a tertiary centre for upper gastrointestinal surgery. Data were collected from a prospectively held database of all adult patients who underwent LARS between October 2014 and August 2019. Information regarding patient demographics and comorbidities, indication for surgery, method of admission, procedure performed, complications, length of stay and readmission were recorded. This work was produced using the Preferred Reporting of Case Series in Surgery guidelines.¹¹

Patient selection

Patients were assessed by an upper gastrointestinal surgeon and must have either typical GORD symptoms with a good response to medical therapy and/or reflux oesophagitis. Mandatory preoperative investigations including upper gastrointestinal endoscopy and barium studies with texture were accepted as sufficient if they were concordant with the clinical history. Selective high-resolution upper gastrointestinal manometry with 24-hour pH study was also used.

Our inclusion criteria for day case LARS include age 18–60 years old, American Society of Anesthesiologists (ASA) grades 1–3, body mass index less than 35kg/m², no previous anti-reflux or extensive abdominal surgery and hiatus hernia up to 10cm in size. Patients must also meet the general day case criteria of living less than one hour from hospital, with someone to drive them home and a responsible adult at home.

Patients are introduced to the rationale for day case surgery in the outpatient clinic and are provided with a written information booklet. Importantly, patients are then contacted prior to surgery by a surgical nurse practitioner to answer any questions and discuss the procedure again. This is critical to managing patient expectations of the postoperative recovery period, enabling them to recover safely at home without needing unnecessary hospital admission. Patients have a full preoperative assessment one week before surgery with a preassessment nurse, and regular medications reviewed as they will need to be either crushed or in dispersible form postoperatively.

Preoperative management

Day case LARS is booked for a morning or early afternoon list. The criterion was that six hours were available from the end of surgery to discharge. Our anaesthesia department has published a 'how to' guide for anaesthesia for day case LARS, which places an emphasis on strong antiemetics and considerate perioperative analgesia. Patients receive a pre-med of paracetamol 1g, diclofenac 100mg (if appropriate), ranitidine 150mg or omeprazole 40mg (or patient's own anti-acid medication), metoclopramide 10mg and aprepitant 80mg.

Intraoperative management

Anaesthesia is induced using a modified rapid sequence induction and is maintained with desflurane or total

intravenous anaesthesia. Muscle relaxation is administered throughout the procedure. Analgesia is with fentanyl (preferred) or morphine; adjuncts if difficult/prolonged surgery include tramadol 50–100mg, magnesium sulphate 2–4g and clonidine 50–100µg. Nausea is a significant issue with LARS, and we recommend a 'triple drug' technique of ondansetron 4–8mg, dexamethasone 7.6mg and cyclizine 50mg for antiemesis. Patients are kept well hydrated with at least one litre of intravenous crystalloids intraoperatively.

Laparoscopic fundoplication has been performed using a range of the established variations in the technique, taking into consideration the size of the hiatus hernia, the patient's symptoms and the surgeon's preference. The degree of wrap used included anterior 90 and 180 degrees, Toupet 270 degrees and Nissen's 360 degrees. However, changes to our pathway over the last three years include a 180 degree anterior wrap as the standard technique among all operating surgeons. Posterior hiatal repair is the standard with anterior sutures placed in selective cases.

Local anaesthesia is routinely used; comprising 40ml 0.25% bupivacaine infiltrated subcutaneously at port sites.

Postoperative management

Postoperative pain is managed initially with rescue analgesia, intravenous fentanyl (preference) or morphine and intravenous tramadol 50–100mg if not used intraoperatively. Once the patient is awake and able to tolerate liquids, paracetamol 1g oral liquid or co-codamol 30/500mg dispersible tablets, ibuprofen 400mg syrup are administered to maintain analgesia. Rescue antiemetics used are ondansetron 4–8mg intravenously, buccal prochlorperazine 5–10mg and cyclizine 50mg.

Patients are provided with oral fluids and a sloppy diet of yoghurt, jelly and custard once they are able to tolerate it. They are reviewed by a surgical consultant or senior trainee and surgical nurse practitioner in recovery to assess progress and answer any questions regarding discharge plan and medications. Patients must have their pain and nausea under control, must have passed urine and must tolerate a sloppy diet to be eligible for day case discharge.

A discharge pack including a patient information sheet explaining the analgesia/antiemetic regimen, diet and contact details for the upper gastrointestinal surgical nurse practitioner is provided. The medication regimen is summarised in Table 1.

Virtual follow-up from our upper gastrointestinal surgical nurse practitioner is a phone call on day 1 and day 5 postoperatively to ensure that patients are recovering well and to answer any questions. Patients have access to a seven-day telephone number to contact the surgical nurse practitioners if they are experiencing any problems, which is vital in preventing unnecessary readmissions.

Data analysis

Data have been described using the median with data range and mean with standard deviation. Analysis was performed using Microsoft Excel.

Results

Demographics and preoperative data

Between October 2014 and August 2019, 366 patients underwent LARS. There were sufficient data to compare the records of 362 patients. The median patient age was 58 years (range 20–91 years) and median body mass index 29kg/m² (range 17–51kg/m²). Patients having day case surgery were younger than those planned to have inpatient surgery, with a median age of 53 years compared with 68 years (range 20–82 years vs 23–91 years). The majority of patients were ASA 1 ($n = 171$) or ASA 2 ($n = 162$) with a small number ASA 3 ($n = 28$) and ASA 4 ($n = 1$). There were fewer comorbidities in the day case group.

Operative data

The most common indication for surgery was gastro-oesophageal reflux disease (33%), regurgitation (18%) and hiatus hernia (29%). Less common indications included anaemia, bleeding, cough and gastric volvulus. The majority of funduplications performed were anterior 180 degrees ($n = 336$), with anterior 90 degrees ($n = 7$), Toupet ($n = 1$) and Nissen's ($n = 16$). A significant proportion of patients had a hiatus hernia greater than 2cm repaired as a concurrent procedure ($n = 276$),

with over 50% of medium to large hiatus hernias having day case surgery (Fig 1; Table 2). There were no conversions to open surgery.

Day of discharge and readmission

Planned day case surgery was performed on 225 patients, with 94% being successfully discharged on the day of surgery ($n = 212$). Those patients who did not meet the day case discharge criteria or were emergencies were managed as planned inpatients ($n = 137$). Over the five-year period, 58% of all patients having LARS were discharged on the day of surgery; two patients who were planned for overnight admission were well enough to go home the same day. As these patients had not received the preoperative day case protocol, they were considered as planned inpatients for the other parts of the analysis. There were 13 unplanned admissions after day case surgery. The reasons for these admissions included pain not adequately controlled ($n = 8$), drain in place ($n = 1$), dysphagia ($n = 1$), exacerbation of chronic obstructive pulmonary disease ($n = 1$) and tachycardia ($n = 1$); one patient had no cause for admission in the notes.

Five patients were found to have giant hiatus hernia intraoperatively. Of these, four were still discharged the

Table 1 Discharge medication regimen

Regular		As required	
Medication	Regimen	Medication	Regimen
Paracetamol syrup 1 g 30/500mg 1–2 dispersible tablets		Tramadol 50–100mg capsules opened and dissolved in water	four times/day for 1 week
Ibuprofen syrup 400mg TDS – 1 week	three times/day for 1 week	Buccal prochlorperazine 3–6mg	twice daily for 1 week
Lansoprazole 30mg OD – 4 weeks	once daily for 4 weeks	Lactulose 10–15ml	twice daily for 1 bottle

Figure 1 Breakdown of day case and inpatient cases

same day with one having an unplanned admission. The median length of stay was one day (range one to three days). The mean length of stay for patients having a planned inpatient admission was 1.44 days (standard deviation 1.06 days).

The rate of patients requiring readmission within 30 days was 2.2%, well below the national average of 8.5%.⁹ Of the eight patients readmitted, seven had had day case surgery. One patient required repeat surgery within 30 days. There was only one intraoperative complication, with a perforation of the gastric fundus that required suturing, which resulted in an unplanned admission. Five patients had postoperative complications: pneumonia ($n = 2$); nausea and vomiting ($n = 1$) and postoperative dysphagia ($n = 1$); prolonged dysphagia requiring revisional surgery ($n = 1$). There was one mortality in the postoperative period following uneventful surgery, from a cardiac event.

Cost saving analysis

The cost of one inpatient bed is £300/bed/night. For a single night's stay, the 212 patients who were successfully discharged on the day of surgery (both planned and unplanned) means a cost saving of £63,600 over the 59-month period, a saving of £12,955 per year.

An additional cost saving with early discharge is that postoperative contrast swallow is not performed. The data suggest that a postoperative swallow test is rarely of use and only in those undergoing repairs of very large hiatus hernia.¹²

Discussion

This case series describes the pathway and outcomes for day case LARS in a tertiary centre for upper gastrointestinal surgery between October 2014 and August 2019. Day surgery is not only cost effective but also improves patient recovery and reduces the risks associated with hospital admission.^{6,13} The Association of Upper Gastrointestinal Surgeons of Great Britain and Ireland (AUGIS) recommends that every centre performing LARS establishes a day case pathway.⁵ A 2018 study investigating LARS across England between 2011 and 2016 has shown poor uptake of day case surgery, with an initial rate of 7.4% that only increased to 15.1% during the study period.⁹

Over the past five years, 59% of patients with a hiatus hernia have been operated on as a day case procedure with hiatus hernias of up to 10cm. In those meeting our day case criteria, our pathway has a 94% achievement in discharge on the day of surgery, substantially exceeding the national average. Only 5.7% of patients having day case LARS required unplanned overnight admission, which is comparable to the rate reported (7.2%) in a 2011 systematic review.⁸ The majority of patients (90.6%) had a length of stay of one day or less and the mean length of stay for the total population was 0.59 ± 0.97 days, which exceeds the standard set by AUGIS of a median two days.⁵ The rate of 30-day readmissions was 2.2%, well below the national average of 8.5%, and supports our view that day case LARS is safe and effective with the appropriate pathways.⁹

There were no conversions to open surgery and the rate of repeat surgery within 30 days was 0.27%, lower than the national rates (0.76% and 1.43% respectively).⁹ Standard practice is for an anterior 180-degree fundoplication, but the eventual choice of wrap is down to the operating surgeon if an alternative is deemed necessary preoperatively or during surgery. There was one intraoperative complication of a gastric perforation. This was noted intraoperatively and was repaired during the initial surgery. There was one postoperative mortality unrelated to the surgery.

The rate of all postoperative complications was low at 1.38%. The results from our department correlate with pre-existing literature that day case fundoplication is feasible and safe in a large proportion of patients requiring anti-reflux surgery.^{8,9} A 2019 study in the United States comparing day case with inpatient LARS (7,734 patients) demonstrated no significant differences in complication rates or 30-day readmission rates between the 2 pathways.¹⁴ Studies on this topic often have stricter criteria for day case LARS, such as limiting the size of hiatus hernia to less than 5cm.^{8,15} In our series, 59% of hiatus hernias 5–10cm in size had successful day case surgery, supporting our view that the even large hiatus hernias can have day surgery repair if suitable and a robust pathway is established.

The success of our day case pathway is multifactorial. Over the past three years of the study, the protocol developed with the 180 degree anterior wrap becoming standard between all the upper gastrointestinal surgeons. The decision to use the anterior wrap was reached as a consensus among the surgeons that it was reproducible and effective. It is now almost ubiquitous as the wrap used for day case surgery (96% had an anterior wrap). With standardisation and using the improved systems, the success rate of the planned day case service continues to rise and in the past two years, 100% of planned day case patients have been discharged on that day.

Appropriate preoperative screening ensures that only those who are safe for day surgery are selected, and reduces predictable, unplanned hospital admissions. Preoperative patient education reinforced by telephone follow-up from our surgical nurse practitioners is crucial. The addition of a seven-day surgical nurse practitioner phone service provides a point of contact for patients with concerns that might have otherwise led to hospital attendance via the

Table 2 Size of hiatus hernia listed for repair as day case or inpatient stay, by size

Size	Day cases ($n = 225$)		Planned admissions ($n = 137$)	
	(n)	(%)	(n)	(%)
Small (< 5cm)	183	81	72	53
Large (5–10cm)	37	16	21	15
> 10cm	5	2	44	32

emergency department. Booking cases on the morning list and having a day case anaesthetic protocol to enhance recovery and reduce adverse effects from surgery, particularly nausea and vomiting, is important. Extending the hours of the day case recovery area to 10pm was a step change and allowed for greater flexibility for patients to recover, especially if there were delays with the list. A comprehensive discharge medication pack with accompanying information on how to use as required medications ensures that patients can manage their symptoms at home. None of this would have been possible without the enthusiasm and dedication of our surgical nurse practitioners, anaesthetists and theatre team, and nurse champions on the day surgical unit.

Conclusion

This study has demonstrated that day case hiatus hernia surgery (including large hiatus hernias) is safe and feasible with a dedicated care pathway and specialist nurse practitioners to support it. Our rates of unplanned admission after day surgery remain low and have resulted in 90.6% of patients having LARS spending one day or less in hospital. The complication rate and rate of reinterventions support the safety of this pathway. We advocate the development of a day case pathway as the norm for anti-reflux surgery in any centre routinely performing these procedures.

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