

Epidemiological trends in surgery for rectal prolapse in England 2001–2012: an adult hospital population-based study

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Abstract

Aim To analyse trends in admission and surgery for rectal prolapse in adults in England between 2001 and 2012 as well as prolapse reoperation rates.

Method Analysis of data derived from a comparative longitudinal population-based cohort study using Hospital Episode Statistics (HES).

Results During the study period, a total of 25 238 adults, of median age 73 [interquartile range (IQR): 58–83] years, underwent a total of 29 379 operations for rectal prolapse (mean: 2662 per annum). The female to male ratio of this group of patients was 7:1. Median length of hospital stay was 3 (IQR: 1–7) days with an overall in-hospital mortality rate of 0.9%. Total number of admissions (4950 in 2001/2002 *vs* 8927 in 2011/2012) and of patients undergoing prolapse surgery (2230 in 2001/2002 *vs* 2808 in 2011/2012) significantly increased over the study period ($P < 0.001$ for trends). The overall increase in prolapse surgery (of 33% overall and of 44% for elective procedures) was dwarfed by an increase in popularity of laparoscopic surgery (of 15-fold). Overall prolapse reoperation rate was 12.7%. The lowest recurrence rate was observed for elective open resection

(9.1%) but this had the highest mortality (1.9%). Laparoscopic and perineal fixations were also associated with low reoperation rates (< 11%) and the lowest mortality rates, of 0.3%, when these procedures were elective. These data refute a trend towards subspecialization (by surgeon or hospital) during the study period.

Conclusion Admissions for rectal prolapse increased in England between 2001 and 2012, together with increases in rectal prolapse surgery. Surgical decision making has changed over this period and may be reflected in outcome.

Keywords Altemeier's operation, Delorme's operation, Hospital Episode Statistics, Laparoscopic rectopexy, Rectal prolapse, Resection rectopexy

What does this paper add to the literature?

This is the largest dataset of patients undergoing surgery for rectal prolapse, comprising over 25 000 patients. The incidence of rectal prolapse and surgical repair in England has increased between 2001 and 2012. Laparoscopic fixation has increased dramatically in popularity and has favourable outcomes in terms of length of stay, mortality and reoperation rates.


Introduction

Rectal prolapse is an uncommon, but highly morbid, condition in which a full-thickness intussusception of the rectal wall extrudes through the anal canal [1–3]. The only potentially curative treatment is surgery, with exceptions being patients considered medically unfit for surgery and those with minor degrees of prolapse. Over

100 different types of surgery for rectal prolapse repair have been described, but despite attempts to provide high-quality evidence, none has achieved primacy [4]. Rectal prolapse can be repaired via the abdomen or the perineum, and several alternative procedures for each approach have been described. Abdominal posterior rectopexy (sacral fixation of the rectum) is generally considered to have a low recurrence rate but may result in poor function, especially constipation [5]. By contrast, the rectum may be fixed using concomitant segmental colonic resection (resection rectopexy): even though some data suggest that this approach has the lowest

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recurrence rate [4], there is a risk of anastomotic leak of 1%–5.9% [6,7]. Perineal approaches (principally Delorme's and Altemeier's) are less invasive and are considered a better option for elderly and medically unfit patients. However, these may have higher recurrence rates (10%–30%) than rectopexy (0%–11%) [8].

Laparoscopic rectopexy was first reported in 1992 by Berman and has re-popularized the abdominal approach [9]. Laparoscopic ventral mesh rectopexy (LVMR) uses anterior rectal dissection with fixation of the anterior rectal wall to a mesh, which is then anchored to the sacrum. This approach theoretically preserves pelvic nerves, thus avoiding the 'rectal inertia' caused by posterior dissection and reportedly resulting in better functional outcome [10]. Several large series on LVMR have now been published, suggesting low recurrence rates and lower short-term morbidity [11–13]. However, this procedure has recently become the subject of media scrutiny in relation to long-term complications from the use of pelvic mesh in general [14,15].

The current study evaluated trends in surgery for rectal prolapse in England from 2001 to 2012 with a focus on type of surgery performed and estimates of recurrence based on incidence of reoperation.

Method

Study design

The study examined a national dataset (described in detail under 'Data sources') to obtain data pertaining to trends in incidence of rectal prolapse diagnosis and operations performed for prolapse according to year. Patients undergoing an index prolapse procedure were followed up longitudinally to determine if they underwent further surgery for rectal prolapse. As such, the study had elements of a multiple cross-sectional and retrospective cohort design.

Data sources

Hospital Episode Statistics (HES) data were obtained from the National Health Service Information Centre (NHSIC) and imported into Microsoft SQL server. All patients admitted with rectal prolapse over an 11-year period (from 1 April 2001 to 31 March 2012) were identified by searching the primary diagnostic codes (K622 for anal prolapse and K623 for rectal prolapse) using the International Classification of Diseases Version 10 (ICD-10 Version:2014). Data were then imported into Microsoft Access (Microsoft Corp., Redmond, Washington, USA) for analyses. Patients who underwent surgery for rectal prolapse were then selected

by searching the Office of Population, Censuses and Surveys Classification of Surgical Operations and Procedures (4th revision) (OPCS-4) codes. The codes used are listed in Table S1. Patients under the age of 16 were excluded from the analyses. It should be noted that there are no HES diagnostic codes for internal prolapse (intussusception) and the cohort will almost certainly have included some patients undergoing surgery for this diagnosis [e.g., those undergoing stapled transanal rectal resection (STARR)]. Such patients represented less than 1% of the whole cohort ($n = 201$).

Patients were subdivided, according to type of surgical repair, into the following six categories using OPCS codes: open fixation; open resection; laparoscopic fixation (laparoscopic codes plus open fixation); laparoscopic resection (laparoscopic codes plus open resection); perineal fixation; and perineal resection. The codes for each group are given in Table S1. Laparoscopic repair was identified by searching all operative codes for Y75* or Y508* using the OPCS-4 codes. Cases of laparoscopic repair that were converted to an open procedure were included with the laparoscopic approach by searching for the codes Y71.4 or Y71.8. Patients were then subdivided into elective and emergency repair according to mode of admission using the 'admission' field to identify how the patient was admitted to hospital (numbers 11, 12 and 13 for elective admission; and numbers 21, 22, 23 and 24 for emergency admission).

Patients identified as having surgery within the 11-year period were followed up until 31 March 2012 using HES patient ID (HESID) to investigate any who had undergone further rectal prolapse operations (as a surrogate for recurrence). The HESID is a unique identifier for every patient and is calculated using NHS number, local hospital number and date of birth. Use of HESID permitted follow-up of patients across time and place, and was used to calculate reoperation rates for each type of surgical procedure. In addition, consultant caseload was identified by searching all patients who underwent surgery performed by a specific consultant per year. The 'Pconsult' code is a pseudo-anonymized code for each consultant [based on their General Medical Council (GMC) number] that permits identification of individual caseloads. Similarly, hospital surgical volumes were calculated by searching the 'Site-Treat' field.

Data analysis

Data have been presented descriptively with summary statistics based on data distribution. Population statistics were derived from Office of National Statistics census

2011 [16] to allow incidence rates per 100 000 population to be calculated for both rectal prolapse admission and rectal prolapse surgery. Limited statistical analyses were performed for time trends using regression of moving averages. All analyses were performed using PASW Statistics for Windows, Version 18.0 (Released 2009; SPSS Inc., Chicago, Illinois, USA).

Results

Tables 1 and 2 and Fig. 1 show the main results, according to year (2001–2012), with 25 238 adult patients undergoing a total of 29 379 operations for rectal prolapse over this time period (mean: 2662 per annum). There were obvious upward trends in total numbers of patients admitted and of those undergoing surgery of any type for rectal prolapse over time ($P < 0.001$ for both).

The number of patients admitted to hospital with rectal prolapse in 2011/2012 was 8927, providing an annual incidence rate of 18.5 per 100 000 for this year; 2808 underwent rectal prolapse surgery, providing a statistic of 6.1 per 100 000 per year. For patients over the age of 75, these rates were much higher (106 per 100 000 and 31 per 100 000 per year respectively). Over the same time period, population statistics showed that the English population increased by about 3.9 million (8.0%), from around 49.1 million in 2001 to 53 million in 2011 [17]. The number of people over the age of 65 years increased by 851 000 (10.9%) for England over the same period. Nevertheless, patient age at surgery remained remarkably constant (median: 73 years) over the same period.

The number of operations performed per year increased by approximately one-third, from 2320 in

2001/2002 to 3293 in 2011/2012. The number of surgeons providing rectal surgery for prolapse increased from 384 in 2001/2002 to 533 in 2011/2012, keeping the median number of operations performed by individual consultants relatively static at only 4 [interquartile range (IQR): 2–7] per year. The number of hospitals providing rectal prolapse surgery increased marginally, from 195 in 2001/2002 to 222 in 2011/2012, with a median increase in number of operations/hospital/per year from 8 (IQR: 5–13) to 11 (IQR: 5–17) in the final year of data analysis. Female patients were six times more likely to undergo surgery for rectal prolapse than male patients, with some operations having a very high female predominance compared with others (Table 2). Median length of stay (LOS) was 3 (IQR: 1–7) days. Overall in-hospital mortality rate was 0.9%. Just over 10% of the operations (2692/25 238 patients; 3063/29 379 operations) were performed as an emergency.

Over the 11-year study period, perineal fixation remained the most popular surgical approach for both elective and emergency rectal prolapse repair (Table 2, Fig. 2). However, the number of patients undergoing laparoscopic surgery (repair/resection) increased more than 15-fold, from only 48 (2.1% of total cases) in 2001/2002 to 725 (22.3% of total cases) in 2011/2012. Over the whole time period, patients selected for laparoscopic surgery were significantly younger [median age: 67 (IQR: 52–79) years] than patients selected for other types of surgery (Fig. 3). By contrast, older patients were more likely to be offered perineal resection [median age: 81 (IQR: 73–86) years]. In the final year of data analysis, the median age for laparoscopic surgery was 65 (IQR: 50–78) years.

Table 1 Trends in numbers of admissions and operations for rectal prolapse: 2001–2012.

| Year | Total admissions | Total pts undergoing surgery | Total operations | Total surgeons | Operations/surgeon: median (IQR) | Total hospitals | Operations/hospital: median (IQR) | Age: median (IQR) |
|-----------|------------------|------------------------------|------------------|----------------|----------------------------------|-----------------|-----------------------------------|-------------------|
| 2001/2002 | 4950 | 2230 | 2320 | 384 | 4 (3–7) | 195 | 8 (5–13) | 73 (58–82) |
| 2002/2003 | 5135 | 2085 | 2352 | 391 | 4 (2–6) | 185 | 8 (4–13) | 73 (57–82) |
| 2003/2004 | 5322 | 2102 | 2404 | 408 | 4 (3–6) | 200 | 8 (5–12) | 73 (58–82) |
| 2004/2005 | 5389 | 1988 | 2321 | 417 | 4 (2–6) | 197 | 9 (5–14) | 73 (59–81) |
| 2005/2006 | 5763 | 2060 | 2451 | 432 | 4 (3–6) | 212 | 10 (6–13) | 73 (59–82) |
| 2006/2007 | 6058 | 2162 | 2543 | 461 | 4 (3–6) | 186 | 9 (5–14) | 74 (61–84) |
| 2007/2008 | 6411 | 2251 | 2612 | 487 | 4 (2–6) | 192 | 10 (6–15) | 73 (59–82) |
| 2008/2009 | 6838 | 2404 | 2798 | 483 | 4 (2–6) | 191 | 10 (5–15) | 73 (59–81) |
| 2009/2010 | 7685 | 2532 | 3031 | 518 | 4 (3–6) | 200 | 11 (6–17) | 73 (58–83) |
| 2010/2011 | 8371 | 2616 | 3159 | 521 | 4 (2–7) | 222 | 11 (5–16) | 73 (58–83) |
| 2011/2012 | 8927 | 2808 | 3293 | 533 | 4 (2–7) | 222 | 11 (5–17) | 73 (58–83) |

IQR, interquartile range; pts, patients.

Table 2 Data according to type of operation for the whole time period analysed (2001–2012)

| Type of repair | Total patients | Total operations | Age: median (IQR) | Ratio: M:F | LOS: days median (IQR) | Total deaths (%) | Total reoperation (%) | % change total operations 2001–2012 (%) |
|--------------------------------|----------------|------------------|-------------------|------------|------------------------|------------------|-----------------------|---|
| a. Elective operations | | | | | | | | |
| Open fixation | 7838 | 7919 | 78 (68–85) | 1:14.0 | 4 (2–7) | 49 (0.6) | 1279 (16.3) | + 9 |
| Open resection | 774 | 886 | 75 (58–82) | 1:9.4 | 7 (4–11) | 15 (1.9) | 70 (9.1) | + 56 |
| Lap fixation | 2303 | 2780 | 65 (50–77) | 1:12.8 | 3 (2–4) | 7 (0.3) | 244 (10.4) | + 1624 |
| Lap resection | 179 | 248 | 67 (51–77) | 1:14.3 | 6 (4–9) | 1 (0.6) | 19 (10.6%) | + 660 |
| Perineal fixation | 9804 | 11 965 | 68 (54–79) | 1:3.7 | 1 (0–4) | 26 (0.3) | 979 (9.9) | + 4 |
| Perineal resection | 1548 | 2322 | 80 (72–85) | 1:14.6 | 4 (2–6) | 10 (0.7) | 262 (16.9) | + 170 |
| Total all operations | 22 446 | 26 120 | 72 (57–82) | 1:6.3 | 3 (1–5) | 109 (0.5) | 2853 (12.7) | + 44 |
| b. Emergency operations | | | | | | | | |
| Open fixation | 1023 | 1093 | 84 (79–87) | 1:16.5 | 14 (8–22) | 26 (2.5) | 146 (14.3) | – 13 |
| Open resection | 164 | 164 | 82 (75–88) | 1:6.4 | 15 (9–28) | 23 (14.0) | 7 (4.3) | + 50 |
| Lap fixation | 113 | 132 | 81 (77–85) | 1:3.7 | 11 (6–22) | 4 (3.5) | 15 (13.3) | + 1250 |
| Lap resection | 3 | 7 | 706 (64–92) | All female | 29 (16–31) | 0 (0) | 1 (33.3) | + 100 |
| Perineal fixation | 1198 | 1344 | 82 (75–88) | 1:7.2 | 13 (5–21) | 24 (2.0) | 129 (10.7) | – 25 |
| Perineal resection | 291 | 424 | 84 (82–86) | 1:28.5 | 12 (8–21) | 12 (4.1) | 40 (13.7) | + 189 |
| Total all operations | 2792 | 3164 | 83 (77–83) | 1:11.9 | 13 (7–23) | 89 (3.2) | 338 (12.1) | + 4 |

IQR, interquartile range; Lap, laparoscopic; LOS, length of hospital stay; M:F, male:female.

Elective surgery for rectal prolapse was associated with a significantly shorter hospital LOS compared with emergency surgery for all types of surgical repair (Table 2). Laparoscopic and perineal fixations,

performed as elective surgery, were associated with the shortest hospital LOS. Elective surgery was also associated with a significantly lower mortality rate (0.5%) than emergency surgery (3.2%). Patients who underwent

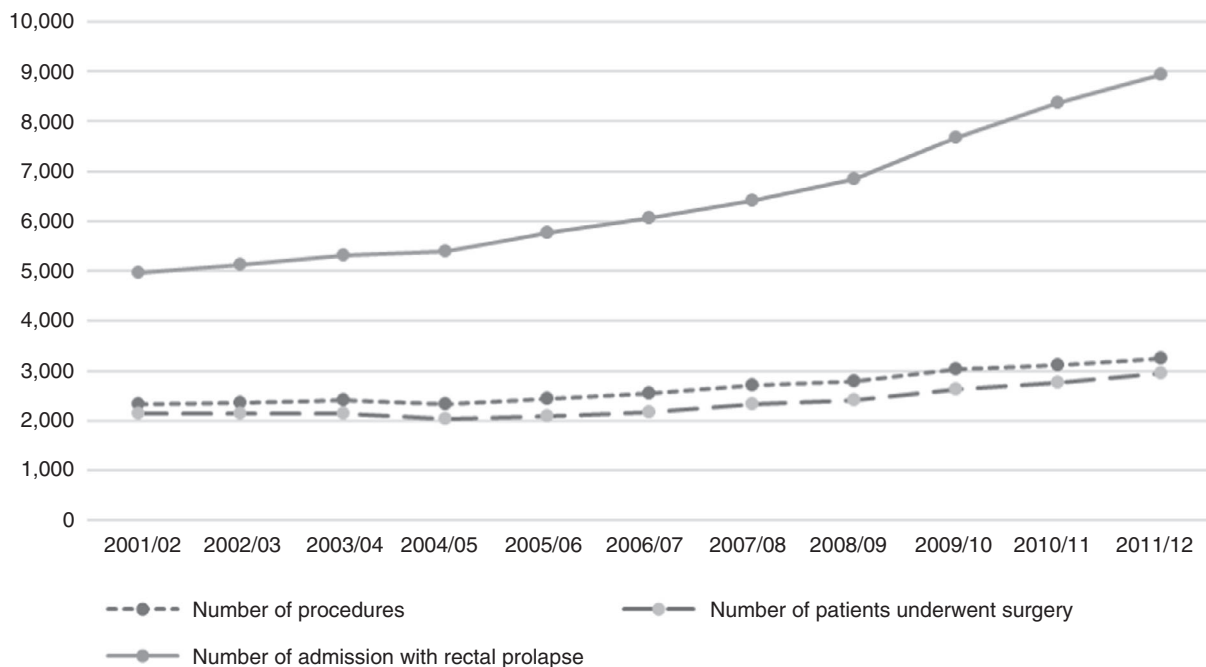


Figure 1 Trends, per year, of the total number of patients admitted with rectal prolapse, the number of patients who underwent rectal prolapse surgery and the total number of rectal prolapse procedures performed.

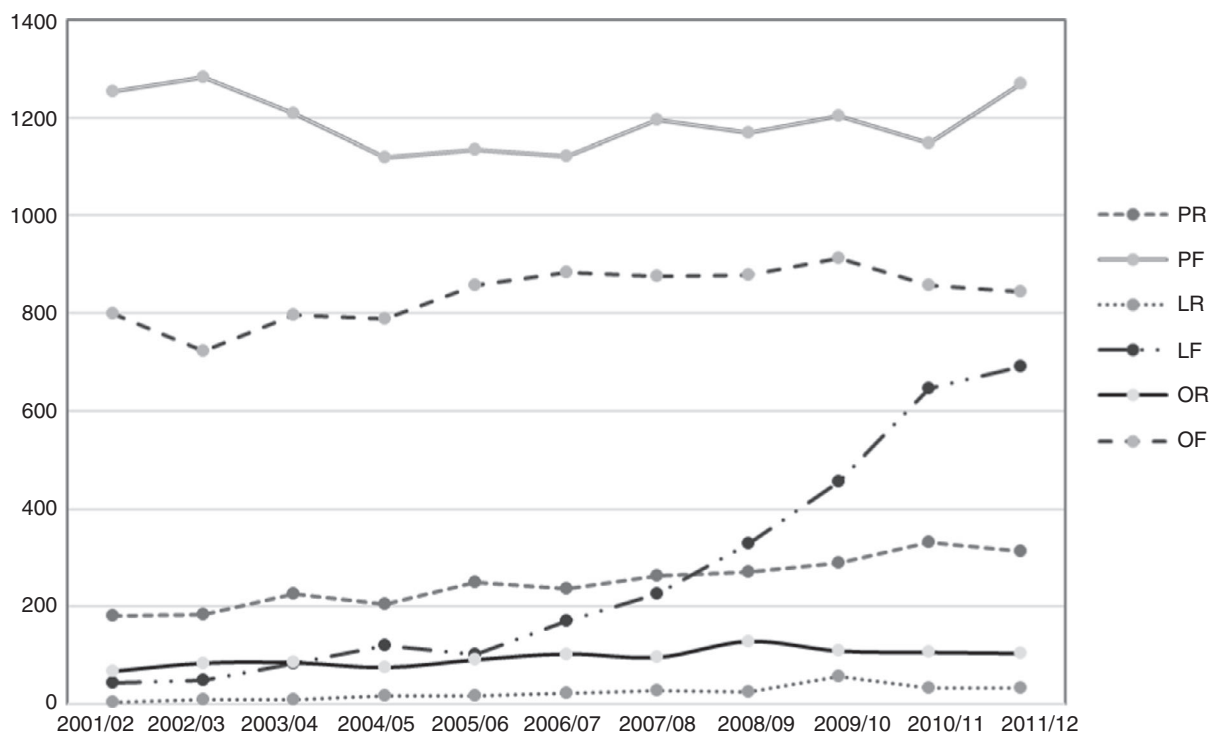


Figure 2 Trends, per year, of surgical procedures for rectal prolapse. LF, laparoscopic fixation; LR, laparoscopic resection; OF, open fixation; OR, open resection; PF, perineal fixation; PR, perineal resection.

open resection were at a higher risk of death compared with those who underwent other types of surgical repair, with a mortality of 14.0% in the emergency setting and 1.9% in the elective setting. Elective laparoscopic and perineal fixations were associated with the lowest mortality, of just 0.3%.

Using HESID-derived data, 3191 (12.6%) patients underwent reoperation for rectal prolapse. The majority (2603; 81.5%) underwent one further surgical procedure; 489 (15.3%) underwent two further operations; and a small proportion ($n = 99$; 3.1%) underwent three or more further operations. Operation type influenced reoperation rate (Table 2) with open resection rectopexy having the lowest reoperation rate (9.1% elective and 4.3% emergency) compared with higher rates for perineal resection (16.9% elective and 13.7% emergency) and open fixation (16.3% elective and 14.3% emergency). Laparoscopic fixation had an intermediate outcome in terms of reoperation (10.4% elective and 13.3% emergency).

Discussion

To the best of our knowledge, this is the largest dataset to date of patients undergoing surgery for rectal prolapse, with over 25 000 patients included. Several of

the findings merit discussion: (1) the incidence of rectal prolapse and surgical repair increased year on year between 2001 and 2012 at a rate greater than that anticipated by population growth alone; (2) there appears to be little evidence of subspecialization regarding rectal prolapse surgery, with unchanged and low numbers of operations per surgeon per annum; (3) laparoscopic fixation has increased dramatically in popularity between 2001 and 2012 and this procedure has favourable outcomes in terms of LOS, mortality and reoperation compared with several other types of surgery for rectal prolapse; (4) there is no compelling evidence for superiority of the abdominal approach over the perineal approach in general; and (5) data confirm the previous assertion of higher risk but a lower reoperation (recurrence) rate after resection rectopexy [18].

The reported incidence of rectal prolapse in our study was 18.5 per 100 000 per year; this is much higher than in a previous report of a Finnish population, of only 2.5 per 100 000 [19]. The overall in-hospital mortality rate for all types of surgery was less than 1%, which is comparable with mortality rates reported in the literature, of 0%–6.5% [20–23]. Recurrence rates reported in the literature vary from 3% to 33% [23–26], depending on the type of surgical repair and length of follow-up. In the present study, the overall reoperation

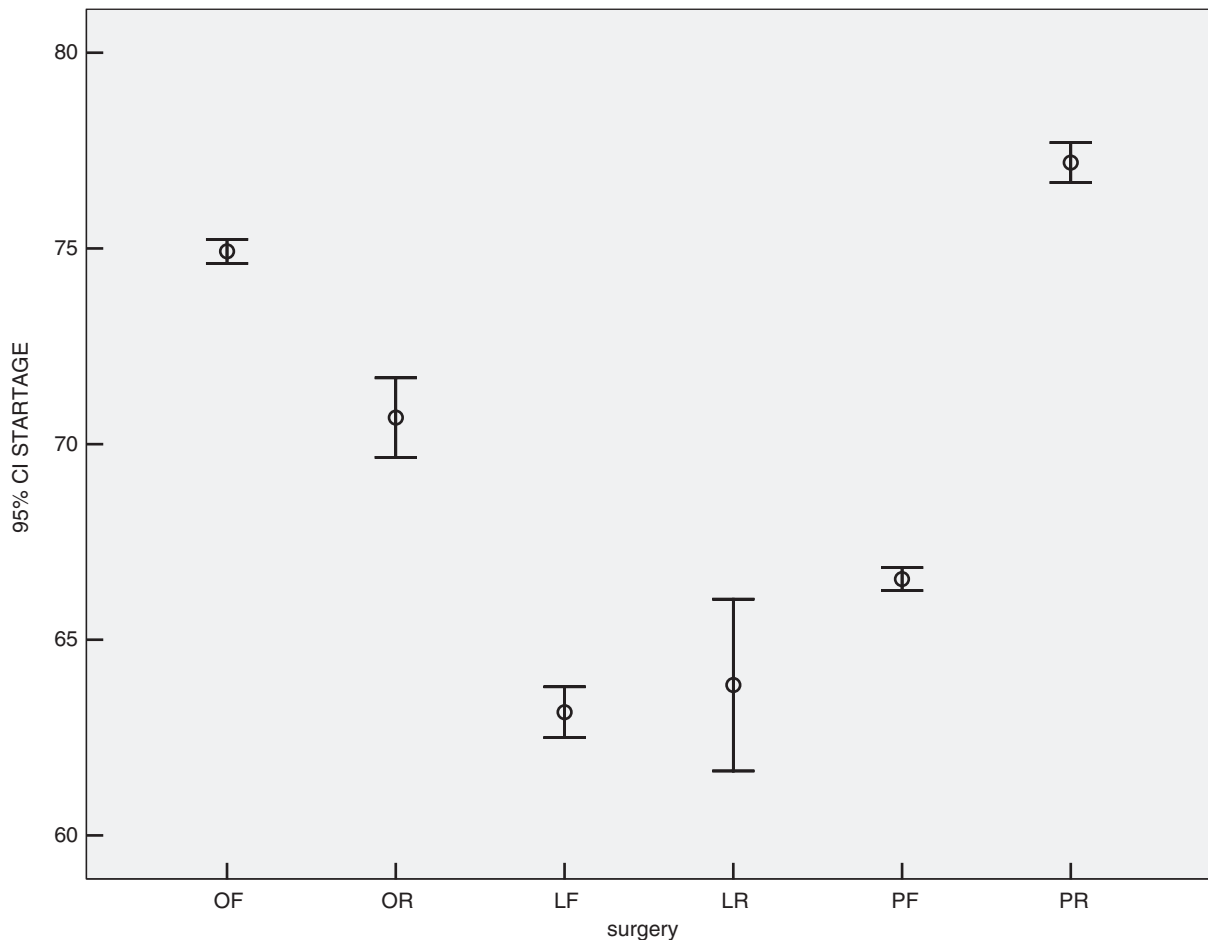


Figure 3 Age of patients when undergoing surgical repair for rectal prolapse, according to the type of rectal prolapse surgery performed. Note that ‘Start age’ is the age of the patient when they first underwent surgery for rectal prolapse. Values are given as median and interquartile range. LF, laparoscopic fixation; LR, laparoscopic resection; OF, open fixation; OR, open resection; PF, perineal fixation; PR, perineal resection.

rate in patients was approximately 12% for both elective and emergency surgery.

There are several limitations to this study. The study used the HES database, which contains administrative data reliant on the accuracy of clinical coding. A recent systematic review shows that coding accuracy is improving and, following the introduction of payment by results in 2002, the accuracy of coding for primary diagnoses has improved from 73.8% (IQR: 59.3%–92.1%) to 96.0% (IQR: 89.3%–96.3%) [27]. It has been suggested that researchers should consider the context of conclusions that are drawn from HES data. If findings are of a general nature, then even a relatively high coding error rate at some, or all, hospitals will not detract markedly from the overall conclusions, particularly if significant deviation can be shown [28,29]. Thus, studies based on HES data may actually be appropriate for dealing with research questions, such as

those posed in the present study, but less effective for identifying variations in care between individual trusts or clinicians [29]. Notably, we were unable to distinguish between patients with external and internal prolapse. There is no HES diagnostic code for internal prolapse and thus a minority of the cohort would be expected to be patients with obstructed defecation syndrome and high-grade internal prolapse. Some specific procedure codes may point to the presence of such patients in the current cohort: for example, per-anal resection of rectum using staples (H412), but only 201 patients (< 1% of the cohort) underwent this procedure. Other procedures (e.g., laparoscopic mesh fixation) have been applied to internal and external prolapse [30,31] but it was not possible in the current cohort to determine how many patients had internal prolapse (hindered further by there being no code for anterior fixation with mesh). We elected to avoid any attempt to

dissect data on this basis and hence we used the term 'rectal prolapse' rather than 'external rectal prolapse' throughout. Another limitation of this study was the use of reoperation rate rather than actual recurrence rate. Therefore, some patients who had a recurrence, but declined (or were unfit for) further repair, will not have been included in the analyses. This indicates that recurrence rates might be higher than the figures provided by these data. Finally, we acknowledge the time period between the data presented (up to 31 March 2012) and the time of writing. While sometimes it is normal for HES data to be presented several years after initial entry [32,33], our data are now 8 years old. We do, however, feel that our results still have value in helping to understand trends in surgical strategy and lack of subspecialization/centralization to at least this point in time. It provides surrogate outcomes on much larger numbers of patients than, for instance, widely cited single-centre cohort studies and an under-recruited trial from the same time period [4].

In summary, this population-based cohort study demonstrates an increasing trend in both numbers of admissions and operations for rectal prolapse over the studied decade. Despite there being little or no evidence of service centralization, there has been a significant change to laparoscopic fixation during this period and this operation appears safe with acceptable reoperation rates.

Conflicts of interest

There are no conflict of interests to declare for all authors.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1. Operative codes for surgery (OPCS4).