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## Outcomes of inguinal hernia surgery in a single region over 15 years

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## **Abstract:**

### Introduction:

Sutured inguinal hernia repairs are now uncommon, with evidence suggesting that those augmented with mesh are associated with a lower later recurrence. We aimed to explore the suggestion that the established use of mesh does indeed lower the rate of operation for recurrence in a single NHS trust.

### Method:

We collected retrospective OPCS coded data across one region of all primary and recurrent inguinal hernia repairs over 15 years (2004-19). Electronic records of recurrent repairs were scrutinised to identify year and type of previous primary repair.

### Results:

7234 repairs were performed during this time of which 289 (4%) were for symptomatic recurrence. Operations for primary repair increased year on year (111 in 2004 to 402 in 2018). Frequency of operation for recurrent herniation declined with increasing use of mesh (8.8% in 2004 to 3.5% in 2019). The majority of repairs (73%) for recurrence were by an open approach. An initial laparoscopic repair was associated with an earlier recurrence as opposed to an open mesh repair.

### Conclusion

Inguinal hernia repairs are increasing in frequency but operations for later symptomatic recurrence following an open primary mesh repair are not.

## **Introduction**

Inguinal hernia repair remains one of the most common procedures performed by general surgeons, with an estimated 70,000 repairs performed in the UK each year <sup>(1)</sup>. Traditional sutured repairs are now performed less commonly, with evidence suggesting that repairs augmented with mesh are associated with lower recurrence rates, shorter operating times and possibly fewer complications <sup>(2)</sup>.

Publications from the Danish Hernia Database describe recurrence rates of 8% for open non-mesh repairs as compared to 3% for Lichtenstein mesh repairs at 8 years <sup>(3-5)</sup>.

However, these studies could be considered flawed as a Shouldice repair (the 'gold-standard' of sutured repairs) was used in only 13% of cases. Furthermore, the concept of 'reoperation' was used as opposed to recurrence rates. Nevertheless, they do offer insights regarding outcomes in populations treated by general surgeons.

Whilst the debate as to the best approach to inguinal hernia repair is clearly important, our patients wish for a speedy recovery in the short term and a low recurrence rate in the longer term. As the use of mesh seems now widely established we aimed to determine if its use does indeed lead to a lower operation rate for recurrence in one region over a period of 15 years.

## **Methods**

The Aneurin Bevan University Health Board (ABUHB) is responsible for the health and wellbeing of the residents of Blaenau Gwent, Caerphilly, Torfaen, Newport and Monmouthshire in South East Wales, UK. It was launched in 2009 following the merger of two large NHS providers. It provides NHS healthcare services across a number of sites to a population of 639,000. Electronic operative records were introduced as part of a new theatre information system, ORMIS (Operating Room Management Information System) in 2004.

We retrospectively collected Office of Population Censuses and Surveys (OPCS) coded data for ABUHB patients for all primary (T2000 *et al*) and recurrent inguinal (T2100 *et al*) hernia repairs over 15 years (2004-19). The electronic ORMIS records of all the recurrent repairs were personally scrutinised by the authors to identify year and type of previous (mesh or otherwise) inguinal hernia repair.

## Results

6945 primary inguinal hernia repairs were performed in the ABUHB Health board in the years 2004-2019. 289 repairs for symptomatic recurrence were also identified during this time, giving an overall rate of operation for recurrence of 4%. Numbers of primary inguinal hernia repairs increased yearly over this time period as did the repairs for recurrent herniation. The rate of operation for recurrence declined throughout the time period, as demonstrated in Table 1 and Figure 1

Of the 289 repairs for recurrence there were initially 149 sutured and 140 mesh repairs. The number of recurrences being repaired, following an earlier sutured repair, decreased year on year and the number repairs for recurrence, following a primary mesh repair increased over time (Fig 2).

Of the 140 mesh repairs that had operations for recurrence, the majority (72% n=102) underwent primary open repair. The remaining 38 underwent primary laparoscopic repair.

These repairs were scrutinised further to look at time between primary repair and reoperation for recurrence. In those who had primary open repair, the mean number of years to reoperation was 8 years compared with 2 years in the primary laparoscopic repair group. 47% of recurrences following primary laparoscopic repair were operated on within 2 years, compared to 25% of primary open repairs. A breakdown of this can be seen in Table 2.

## Discussion

There is little doubt that our patients wish for a speedy recovery from their inguinal hernia repair. This can be achieved with either an open or laparoscopic approach both of which are augmented with prosthetic mesh. Whilst traditional sutured repairs may be used these are not performed on a regular basis in the UK (Light *et al in Annals* 2020). In the longer term our patients wish for a robust outcome in terms of a low recurrence rate, which is afforded by those repairs augmented with mesh. However such repairs can affect the patient's quality of life due to chronic distressing symptoms. This is clearly undesirable and we are duty bound to consent patients appropriately as to the benefits and risks of a repair.

In this population-based study, although there was some annual variation, the number of primary inguinal hernia repairs increased over this 15-year period. However during this time, the rate of operation for symptomatic recurrence fell, demonstrating a causal link between an initial mesh repair and a reduction in the rate of operation for a later recurrence. Overall the average rate of reoperation for was 4%. This is somewhat higher than those from the Danish Hernia Database where reoperation rates, at 30 months, were 2.2% and 2.6% for anterior mesh repair and laparoscopic repairs respectively <sup>(3)</sup>.

It is important, however, to note that we placed no timeframe on reoperation, nor differentiated between reoperation following a primary or recurrent repair, indeed we believe that this accurately reflects the management of inguinal hernias in UK general surgical practice. Furthermore the concept of reoperation, as previously mentioned, differs to recurrence rates as it does not include every patient with recurrence. It is a reflection of those with recurrence who are deemed suitable for operation, either through symptoms or increased risk of complications. It is worth remembering that reoperation itself carries significant risk of further recurrence <sup>(3-5)</sup> and increased risk of chronic groin pain <sup>(6)</sup>.

The results of this type of scrutiny have limitations that are worth mentioning. Whilst we were able to eliminate incorrectly coded procedures, primary repairs coded as non-hernia repairs would have been missed. Likewise, we may have missed primary or recurrent inguinal hernia repairs initially and incorrectly coded as another intervention. This is clearly

an obstacle but also present when analysing registry databases where the asymptomatic recurrence is not recorded or managed surgically.

There is little doubt that the use of prosthetic mesh in primary inguinal hernia repair is well established. However there remains genuine concern amongst surgeons and patients regarding the issue and frequency of “mesh induced” chronic groin pain (CGP) <sup>(7)</sup>.

Fortunately a recent Cochrane review of 25 studies has demonstrated no difference in rates of chronic pain between non-mesh repairs and open and laparoscopic repairs, as well as suggesting that mesh repair was associated with shorter hospital stay and shorter recovery times <sup>(2)</sup>. In addition, there is good evidence, that rates of CGP increase subsequently with each subsequent operation for recurrence <sup>(6)</sup>, suggesting that we can influence incidence of CGP by employing a repair that reduces recurrence rates.

How can we further decrease recurrence rates at extended follow-up? Maybe it is time to consider the appointment of health service surgeons that concentrate solely on the repair of inguinal hernias? At this point it is timely to recall the words of Sir Cecil Wakeley who said “a surgeon can do more for the community by operating on hernia cases than by operating on cases of malignancy”. This long forgotten proposal has now come to be supported by both surgeon volume and hospital volume data <sup>(8, 9)</sup>. Unless such changes are considered in the future we suspect that similar assessments will demonstrate recurrence rates that are troublesome to the patient and are not cost effective. We can no longer blame the tools but those who use them.

## Figures and Tables

Table 1: Breakdown of primary repairs vs repairs for recurrence

Year	Number of primary repairs	Repairs for recurrence	Rate of repairs for recurrence
2004	111	9	8.1%
2005	216	15	6.9%
2006	504	10	2.0%
2007	344	15	4.4%
2008	474	10	2.1%
2009	512	12	2.3%
2010	423	18	4.3%
2011	451	26	5.8%
2012	500	15	3.0%
2013	511	17	3.3%
2014	475	13	2.7%
2015	615	25	4.1%
2016	559	32	5.7%
2017	502	29	5.8%
2018	402	31	7.7%
2019	346	12	3.5%

Figure 1: Number of primary IH repairs and recurrent IH repairs from 2004-2019

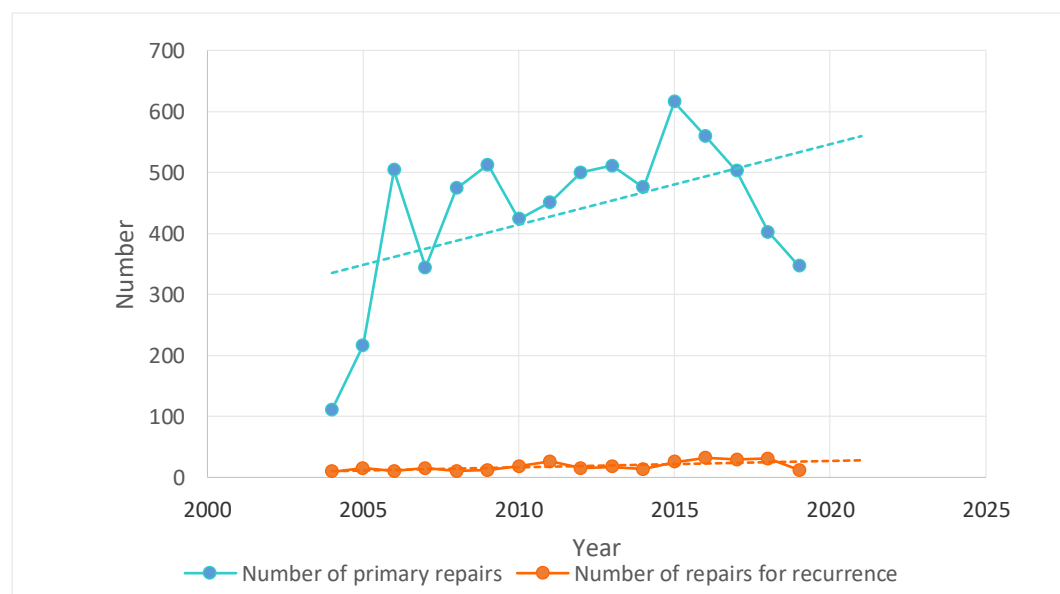




Figure 2: Number of operations for recurrence split by percentage of primary suture vs mesh repairs per year

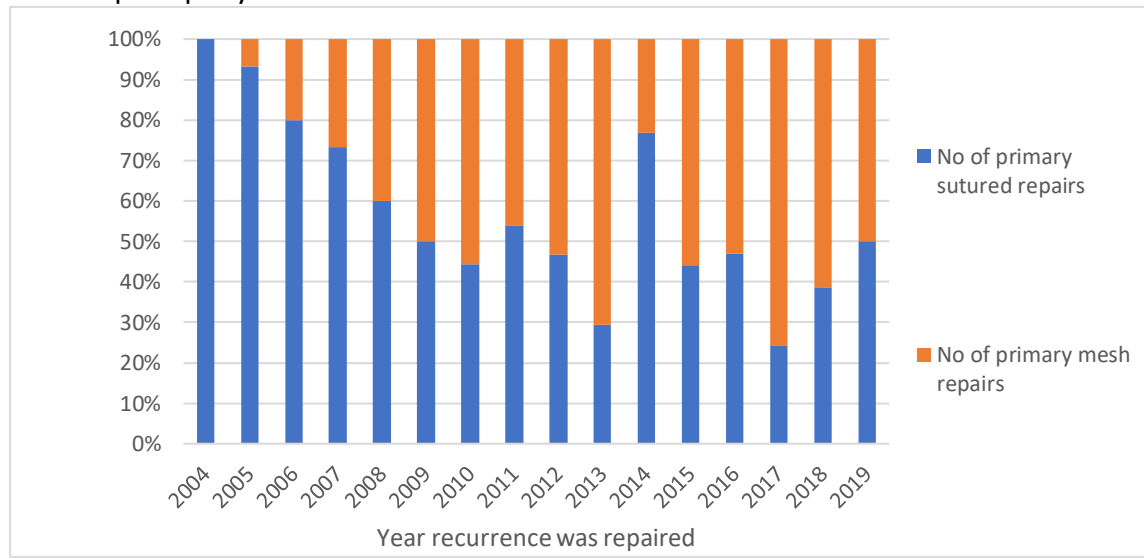


Table 2: Breakdown of recurrence by primary operation type.

	Total number	Mean time to recurrence repair (years)	Median time to recurrence repair (years)	Number of recurrences within 2 years of primary repair
Primary Lap	38	2	2	18 (47%)
Primary open	102	8	6	26 (25%)

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