



Comparison of The Recurrence Rate of The Inguinal Hernia in The General Hospital & Speciality Hospital in Bhuj, Gujarat

Dr. Madhukar Rajaram Wagh

Assistant Professor, Department of Surgery, Gujarat Adani Institute of Medical Sciences, Bhuj, Gujarat.

Dr. Jagdish Dave

Assistant Professor, Department of Surgery, Gujarat Adani Institute of Medical Sciences, Bhuj, Gujarat.

ABSTRACT

Introduction: Comparison was done in hernia recurrence rates in patients undergoing primary elective inguinal hernia repair at general hospitals with the specialty hospital in bhuj, Gujarat.

Methods: We conducted an administrative data analysis of persons who underwent inguinal hernia repair in the period of 5 years. Risk of recurrent hernia repair was estimated according to hospital type and volume, using Cox proportional-hazards regression models.

Results: Recurrence risk in the lowest volume quartile was 5.7%, compared to 3.9% at high volume general hospitals and 1.1% at the specialty hospital. Compared to persons who had surgery at the lowest volume hospitals, hernia recurrence among specialty Hospital patients was substantially lower after adjustment for confounding variables (hazard ratio 0.18, CI (0.16 to 0.19), $P < 0.001$).

Conclusions: Persons who had elective primary inguinal hernia repair at the specialty Hospital had a substantially lower risk of recurrence than those treated at general hospitals, including high volume general hospitals.

KEYWORDS

Inguinal Hernia, Recurrence Rate, General Hospital, Speciality.

Introduction:

An inguinal hernia is a protrusion of abdominal contents into the inguinal canal through an abdominal wall defect. A direct inguinal hernia protrudes through the deep inguinal ring, whereas an indirect inguinal hernia protrudes through the internal inguinal ring (and may descend through the inguinal canal).¹ Direct hernias typically develop only in adulthood, and are more likely to recur than indirect hernias. If the hernia is severe enough to restrict blood supply to the intestine, it is termed a strangulated hernia, and immediate corrective surgery is necessary. Most inguinal hernias, however, are less dangerous, and elective surgery is often performed to correct the defect. Symptoms include abdominal pain and a lump in the groin area, which is most easily palpable during a cough. Some inguinal hernias, however, are asymptomatic.^{2, 3}

This leads to discomfort and pain for the patient, and can lead to complications, thus often requiring surgical intervention. Although the exact incidence and prevalence of inguinal hernia worldwide is unknown, it is very common and an estimated 20 million surgical procedures for inguinal hernia are performed each year all over the world. Operation rates specific to each country vary greatly, but range between 100-300 procedures per 100,000 persons per year.^{2, 4}

Numerous classification systems have been proposed for groin hernias. One commonly used system was introduced by Nyhus in 1993. This system employs several clinical factors including direct/indirect, degree of enlargement of the internal inguinal ring, and degree of posterior wall weakness.⁵ Specifically, it comprises six types of increasing severity: 1) indirect inguinal hernia with a normal internal ring; 2) indirect inguinal hernia with an enlarged internal ring; 3a) direct inguinal hernia; 3b) indirect inguinal hernia causing posterior wall weakness; 3c) femoral hernia; 4) recurrent hernia.

Since there are multiple repair techniques available to treat inguinal hernias surgically, appropriate treatment can be individualized according to the patient's profile as well as surgical preferences. The following are the different surgical repair options available to surgeons to treat inguinal hernias.⁶

Group 1: Open anterior repairs, are referred to as such because they involve the surgeon opening the external oblique aponeurosis and then freeing the spermatic cord. After dissection of the transversalis fascia, a thorough inspection of the inguinal canal, the indirect space and the direct space is completed by the surgeon. The hernia sac is usually ligated during this type of surgery, and the defect in the canal floor is subsequently reconstructed.⁷

Group 2: Open Posterior Repairs. This technique is different from the open anterior repair techniques described above because in this type of surgery, abdominal wall layers are divided superior to the internal ring and then the properitoneal space is entered. Dissection is then continued behind the inguinal region, and despite the different approach, this posterior dissection allows for excellent visualization of the concerning areas in an inguinal hernia repair.⁸

Group 3: Tension-Free Repair (Mesh). Tension-free hernia repair techniques such as Lichtenstein and Rutkow techniques initially use the same approach as described above in the open anterior repair types.⁹

Group 4: Laparoscopic Procedures. Laparoscopic hernia repair gained popularity in the 1990s, along with open mesh repair, but this minimally invasive technique has also sparked significant controversy.¹⁰

Volume-outcome relationships have been studied considerably in the past, due to the potential high impact implications of such relationships in various areas of medicine. Numerous studies on this topic have indicated that there is an inverse relationship between hospital volume (that is, the number of cases treated) and outcomes (patient complications), for many different surgical procedures. Although it is not known what proportion of the effect observed is a result of the volume-outcome relationship, it can be said with confidence that the effect of volume on outcomes is often undeniable. Volume-outcome trends at general hospitals in Bhuj had not yet been compared with a specialty hospital for hernia repair; hence this was the focus of our research.¹¹

Materials & Methods

We conducted a retrospective cohort study using population-based administrative health data for the province of Bhuj. Randomized clinical trials, which are considered one of the most reliable study design methods, are often not an option when conducting research to assess surgical outcomes, due to ethical and practical reasons. Such a study would be expensive to conduct, would require a long follow-up, and it would also be difficult to conduct as standardization of procedures would be difficult to coordinate. Therefore, a retrospective cohort study, which allows for the post hoc evaluation of outcomes, allows for the reliable observational assessment of the specified cohort.

For the purposes of this study, the cohort of patients, their exposure statuses, as well as their outcomes after the exposures, were all identified after follow-up had been completed. This study design is beneficial as it allows for time-efficiency when the analyses are being completed, as the data has already been gathered in the past; however, a disadvantage is that the data collected is often for other purposes, for instance, in this case, for physician billing purposes, rather than for the study.

Results

For the study outlined in this document, a cohort of persons who underwent primary elective hernia repair in the province of Bhuj between the period of last five years was identified via electronic administrative health data records.

This cohort of patients was followed to observe outcomes of interest (hernia recurrence) during the study period following their initial procedure. The primary objective of the study was to compare inguinal hernia recurrence rates between low vs. high volume general hospitals in Bhuj and a high volume surgical specialty center, the Specialty Hospital. General hospitals in Bhuj performing inguinal hernia repairs were divided into quartiles based on patient volume, with each quartile having approximately the same number of patients. Patients who underwent treatment at the Specialty Hospital were categorized separately as they had treatment at a specialty hospital.

Baseline comparisons across quartiles were made using χ^2 -test for categorical variables; the effect of hospital volume on hernia recurrence rates was determined using adjusted logistic regression and Cox proportional hazards regression. Both models allowed for adjustment for any confounding variables: age, sex, income quintiles and CADG categories. Goodness of fit for the logistic regression model was determined via the Hosmer-Lemeshow test, with p values > 0.05 indicating adequate model fitting.

A minimal follow-up period of 3 years was thereby ensured for all patients. All statistical analyses were completed using SPSS software. P-values less than 0.05 were considered statistically significant for all analyses. The proportional hazards assumption was tested via visual inspection of Kaplan-Meier curves.

A total of 9000 inguinal hernia recurrences were treated surgically during the study period, as defined by the criteria for this study. The risk of recurrence in the lowest volume quartile was 5.2 (95% CI 4.9% to 5.5%), as compared to 4.8 (4.5% to 5.0%) at high volume general hospitals and 1.2 (1.1% to 1.3%) at the specialty hospital.

Discussion:

A volume-outcome relationship has been discussed and documented numerous times in the medical literature; typically, the higher the volume of procedures completed, the better the outcomes are for patients.¹² Although the trend demonstrated across quartiles in this study, which indicated increasingly beneficial outcomes with increasing hospital volume is consistent with past medical literature, the main theme of this study was to discover if high volume at a specialty hospital, such as Specialty, provides patients with a significant benefit when compared to high volume at a general hospital.¹³

Using a dataset with full population coverage from a publicly funded health care system in Bhuj, we demonstrated that indeed, there is a significant difference, since the risk of recurrence is 4.8% (95% confidence interval: 4.5% to 5.0%) at high volume general hospitals, which is significantly higher than 1.2% (95% confidence interval: 1.1% to 1.3%) at the Specialty hospital.¹³

Recurrence rates at Specialty Hospital have been reported to be low since the inception of this specialty hospital; however when the Specialty technique is compared to other repair techniques, the recurrence rate using the Specialty technique outside the Specialty Hospital is reported to be between 5-8%.¹⁴

Specialty Hospital reports that the 1% recurrence rate at Specialty hospital is not just the result of the specialized surgical repair technique, or the surgical expertise, but rather that the Specialty technique is more effective than other techniques when performed at an extremely high volume, as is done at Specialty Hospital. This is why when the Specialty technique was used at centers outside of Specialty Hospital at low volumes, outcomes were not found to be as favourable as those observed at Specialty Hospital.

Results from this study show that 50,000 individuals underwent elective primary inguinal hernia repair at Specialty hospital over the study period. These individuals had a 1.1% risk of developing a recurrence, as compared to those who had their primary repairs at general hospitals in Bhuj. The analysis of patient selection at Specialty indicated that roughly 10% of individuals who initially had a consultation at Specialty hospital, did not go on to have surgery there. These individuals may have been turned away due to various factors, or may have opted themselves to be treated at a general hospital.

Conclusion

The purpose of this study was to compare hernia recurrence rates in patients undergoing primary elective inguinal hernia repair at general hospitals with a high volume hernia specialty center (the Specialty Hospital in Bhuj). The result of this large population-based cohort study was that persons who had elective primary inguinal hernia repair at the Specialty Hospital had a substantially lower risk of recurrence than those who had surgery at general hospitals, including high volume general hospitals.

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