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Resident postgraduate year does not influence rate of complications following inguinal herniorrhaphy

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ABSTRACT

Background: Previous data indicate that patients who undergo surgery with a postgraduate year 3 (PGY-3) resident as the junior surgeon have a lower rate of recurrence compared with PGY-1 and PGY-2 after an open inguinal herniorrhaphy. Lower PGY level was also associated with increased operative time. We hypothesize that when controlling for surgeon, technique, and hernia type, the outcomes for inguinal herniorrhaphy are the same independent of PGY level. **Materials and methods:** A retrospective review of all open unilateral inguinal hernia repairs done by residents who assisted the same senior surgeon at the Veterans Affairs North Texas Health Care System was performed.

Results: Seven hundred fifty-two open unilateral inguinal hernia were identified: mean patient age = 60.6 ± 12.7 y; mean body mass index = 27.0 ± 10.8 kg/m²; American Society of Anesthesia III-IV = 51%; and Nyhus type 2 = 44.7%, 3a = 41.6%, and 3b = 13.7%. Residents involved were PGY-1 (17.2%), PGY-2/3 (71.1%), and PGY-4/5 (11.7%). Postoperative complications for intern, junior (PGY-2 and PGY-3), and senior residents (PGY-4 and PGY-5) were 4%, 9%, and 6%, respectively ($P = 0.14$). Compared to interns, junior residents finished the operation 3.9 min faster (95% confidence interval = $-7.5, -0.3$). There was no time difference between interns and senior residents completing the operations after controlling for hernia type. Logistic regression did not identify PGY level as an independent predictor of complications or recurrence.

Conclusions: There was a slight decrease in operative time when the repair was done with junior-level residents. PGY level did not influence outcomes for open, unilateral inguinal herniorrhaphy when controlled for hernia type and technique.

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Introduction

Assessing resident surgical outcomes is important for any hospital and residency training program. Graded

responsibility and redundancy in patient care are the basis of surgical training with the core component of adequate faculty supervision. There is a perception of less attending involvement at teaching hospitals compared to the private sector,

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especially at Veterans Affairs (VAs) Hospitals, leads to more complications.¹ Multiple studies have demonstrated that resident involvement does not influence outcomes for major surgeries.^{2–6} Thus, studies have shown almost homogeneously that an operation performed under appropriate attending supervision has similar outcomes whether performed by a resident or staff surgeons alone.^{3–6} Another issue is whether the level of the resident involved in the surgical procedure affects outcomes in surgery. In this regard, the level of resident involved in the case has not been shown to affect outcomes under proper supervision for several surgical procedures.^{7–10}

Because inguinal herniorrhaphy is one of the most common general surgery operations in the United States,¹¹ it is commonly performed by trainees and it serves as an ideal procedure for teaching residents at all levels. A large VA cooperative study demonstrated that higher post-graduate year (PGY) was associated with better outcomes and less operative time.¹ The analysis for this study included faculty members from 14 different institutions with varying surgical techniques, which made the analysis heterogeneous and difficult to interpret. The aim of our study was to interrogate our institutional experience with a standardized technique for inguinal herniorrhaphy with the goal of comparing our analysis to the VA cooperative results with regard to PGY-level outcomes and operative time following open inguinal hernia (IH) repairs. We hypothesize that when controlling for surgeon, technique, and hernia type, the outcomes for inguinal herniorrhaphy are the same independent of PGY level.

Methods

This was a retrospective review of unilateral, open IH repairs done by residents who assisted the same senior surgeon between 2005 and 2016 at the VA North Texas Health Care System. Altogether, a database with input collected prospectively by the primary investigator is inclusive of 1049 IH in 965 patients from July 2005 to November 2016. Of these, only unilateral, open IH repairs were included for analysis. All data were extracted from the VA Computerized Patient Medical Record System. Operative times were recorded by the operative circulator nurse as the time of surgical incision (start time) to placement of the surgical dressing (end time). This study was approved by the Institutional Review Board at the VA North Texas Health Care System.

Bilateral, recurrent, laparoscopic, tissue repair, femoral, and IH repair simultaneously with an umbilical hernia were excluded from the analysis ($n = 297$). Inguinal hernias were categorized by the Nyhus classification as previously described in the literature.¹²

Open technique

All hernias were repaired with a standardized method by a single surgeon and a surgical resident (PGY-1 to PGY-5) as previously described.¹³ Most hernia repairs were performed under general anesthesia. Regional anesthetic was also employed via spinal anesthesia applied by the

anesthesiologist. Local anesthetic was also employed in 1.8% of the patients. This was always applied by the surgeon as previously described.⁸ All patients received preoperative antibiotics per Surgical Care Improvement Protocol and institutional guidelines. All hernia repairs for this study were performed via the open technique. The open approach consisted of a skin incision down to the aponeurosis of the external oblique with electrocautery. A stab incision is made in the aponeurosis of the external oblique and extended toward the superficial inguinal ring with Metzenbaum scissors. The spermatic cord is isolated at the level of the pubic tubercle and encircled with a penrose drain. If the ilioinguinal nerve is identified, it is divided and ligated at the most proximal end with 3-0 Vicryl. Indirect hernias undergo isolation of the sac, and the hernia sac is opened and ligated or reduced if a sliding component is suspected. The floor is imbricated with 0 Vicryl if there is a protruding direct component. The floor is then repaired with a 6 × 3 inch polypropylene mesh (Ethicon Inc, San Angelo, TX) that is cut in a cone configuration to accommodate the size of the inguinal floor by crating tails around the cord structures. This is secured inferiorly to the shelving edge of the inguinal ligament with 0 polydioxanone suture in a running fashion and superiorly to the conjoint tendon with interrupted 0-ethibond sutures. At the end of the operation, 10 mL of 0.25% bupivacaine with epinephrine (1:200,000) is infiltrated along the hernia incision. Oral opioids are prescribed (hydrocodone bitartrate and acetaminophen; NORCO) for the postoperative period.

Grouping of residents

Residents were grouped into three sets: (1) interns (PGY-1), (2) junior residents (PGY-2 and PGY-3), and (3) senior residents (PGY-4 and PGY-5). PGY-2 and PGY-4 residents could have been placed anywhere without affecting the results, as the number of these residents were small. This is the result of our training program where PGY-2 and PGY-4 residents do not typically rotate at the VA hospital for their operative experience. In the present study, we controlled for surgeon and technique to assess the effect of PGY level on overall complications, operative time, and recurrence.

Statistical analysis

All data are presented at means ± standard deviation. Patient demographic and clinical information, perioperative data, and resident-level involvement were compared between patients who had a postoperative morbidity and those who did not. Wilcoxon rank-sum test and Fisher's exact test were used to compare continuous and categorical variables, respectively.

Patient postoperative morbidity was examined in a multi-variable logistic regression model. The model was constructed using a forward stepwise technique. Operative time was analyzed using an ordinary least square linear regression model. All statistical tests were two sided, and the significance level was 0.05. The analysis was performed in Stata version 14 (College Station, TX).

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