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The utility of pathologic evaluation of adult hernia specimens

Patrick M. Chesley, M.D.[a], George E. Black, M.D.[a], Matthew J. Martin, M.D.[a], Eric K. Johnson, M.D.[a], Justin A. Maykel, M.D.[b], Scott R. Steele, M.D.[a,*]

[a]*Department of Surgery, Madigan Army Medical Center, Ft. Lewis, WA, USA;* [b]*Department of Surgery, UMass Memorial Medical Center, University of Massachusetts Medical School, Worcester, MA, USA*

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Abstract

BACKGROUND: Pathological examination of hernia sac specimens adds additional steps and cost to a surgical procedure but has no proven benefit. Although well studied in pediatrics, there are limited data in the adult literature pertaining to this practice.

METHODS: This is a retrospective analysis from a single institution referral center over a 4-year period (2007 to 2011). All inguinal, incisional, ventral, and umbilical hernia repairs greater than 18 years of age were included.

RESULTS: A total of 1,216 inguinal (55.4%), incisional (11.4%), umbilical (21.5%), or ventral hernia (11.7%) repairs were included. In 246 cases (20.2%), hernia sac specimens were sent to pathology (open 96.7%; laparoscopic 3.3%). There were no cases in which management of the patient changed because of the final results.

CONCLUSION: The rarity of changes in diagnosis and treatment from routine pathologic examination of a hernia sac does not justify this practice and indicates that it may be omitted except in unique circumstances.

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The repair of inguinal and abdominal wall hernias encompasses a substantial portion of a general surgeon's practice. During repair, the herniated contents encased in fibrous tissue are reduced, the defect repaired, and the hernia sac is excised and often sent to pathology for review. This practice is a remnant from the 1926 Minimum Standard for Hospitals, which was published by the American College of Surgeons, and states that "all tissues removed at operation shall be examined and reports rendered thereon."[1] This was reaffirmed in 1998 by the Joint Commission on Accreditation of Healthcare Organizations with the statement that "specimens removed during surgery need to be evaluated for gross and microscopic abnormalities before a final diagnosis can be made."[2]

Literature regarding the utility of pathological evaluation of the hernia sac in adult patients is scarce, despite the financial pressures being placed on many institutions to practice cost-effective medicine. It has previously been a standard practice to submit all excised hernia sac specimens

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* Corresponding author. Tel.: +1-253-968-2200; fax: 253 968 5900.
E-mail address: harkersteele@mac.com

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for pathology evaluation; however, many institutions are beginning to question this practice. In 1998, 413 institutions enrolled in a quality improvement program for the College of American Pathologists, from which 28 institutions had policies that exempted inguinal hernia sac specimens from evaluation, while 98 others allowed for only gross examination.[3] Another study evaluated whether results of pathologic evaluation return abnormal findings, and despite reviewing over 800 hernia repairs, only 1 case returned an unexpected result of atypical lipoma, and this ultimately did not change patient management.[4] Interestingly, there were 3 cases that were judged to carry clinical significance based on their pathologic findings, but review of their operative records showed that there was intraoperative concern for an abnormality. One study reviewed over 2,000 hernia repairs finding that only 34 cases were sent for pathologic evaluation and there were no results that changed patient management.[5]

The aim of this study is to review of all inguinal, umbilical, ventral, and incisional hernia repairs performed at a regional medical center to determine the frequency in which pathologic evaluation of the hernia sac is performed, the incidence of abnormal findings and their implications, as well as the cost effectiveness of this practice.

Methods

A review of all inguinal, incisional, umbilical, and ventral hernia repairs from 2007 to 2012 was performed after approval from the Madigan Army Medical Center Institutional Review Boards (Institutional Review Board number 386562-1). Our institutional operative case log system (ORMA and S3) was searched using key words hernia, herniorrhaphy, inguinal, ventral, incisional, and umbilical to identify potential cases. Patients were included in the study if they were at least 18 years old and underwent repair. Exclusion criteria were those patients under 18 years of age, those undergoing herniorrhaphy with surgical specialties aside from general surgeons, and types of hernia repairs other than those listed above. Operative reports for these patients were reviewed to obtain the type of procedure, surgical approach, use of mesh, and pathologic evaluation of specimen. When the specimen was sent for pathologic evaluation, the operative report was used to determine if this was done routinely or if there were abnormal intraoperative findings that prompted the evaluation. Patient medical records were then reviewed to obtain the results of the pathologic evaluation as well as to determine if the results led to a change in patient management. A change in care was defined as postoperative evaluation using radiographic analysis, laboratory analysis, or clinical/surgical follow-up for a specific finding based on the hernia sac examination. Statistical analysis was performed using PASW Version 19.0 (SPSS, Chicago, IL). A chi-square test was used to test the significance of specimens being sent from the laparoscopic or open approach. A multivariate logistic regression was used to examine factors such as age, sex, procedure type, and approach to identify the relationship between these factors and whether a specimen was sent. Statistical significance was determined with an alpha level set at .05.

Results

We identified 1,216 cases from 2007 to 2011. These cases were predominately inguinal hernia repairs (n = 674, 55.4%), followed by umbilical (n = 261, 21.5%), ventral (n = 142, 11.7%), and incisional (n = 139, 11.4%) locations. The mean age was 45.6 (range 18 to 90) years with 928 men (76.3%) and 288 women (23.7%). Repairs were performed using an open approach (n = 819, 67.4%), while laparoscopic procedures accounted for 397 cases.

Hernia sac specimens were sent for pathologic evaluation in 246 cases (20.2%), with a significant amount being sent from open cases (n = 237; 96.3%, $P<.001$) and the remaining 3.7% (n = 9) of specimens were sent from laparoscopic cases. Overall, the majority of specimens were sent from inguinal hernia repairs (n = 158, 64.2%), followed by umbilical hernia repairs (n = 38, 15.4%), incisional hernia repairs (n = 26, 10.6%), and ventral hernia repairs (n = 24, 9.8%). The majority of these specimens were sent from male patients (211, 85.8%). Specimens sent from laparoscopic repairs were from inguinal hernia repairs (n = 7), umbilical hernia repairs (n = 1), and incisional hernia repairs (n = 1). On multivariate logistic regression, male sex and open approach were significant predictors of specimen being sent (Table 1).

The vast majority of specimens (n = 237, 96.3%) were sent to pathology on a routine basis. In 9 cases (3.7%), the specimens were sent because of abnormal intraoperative findings (Table 2). Two of these specimens were sent from laparoscopic cases (22.2%). There were no results after

Table 1 Predictors of specimens being sent

Variable	Odds ratio	*P* value	95% confidence interval
Sex	.428	<.001	.285–.643
Inguinal hernia	1.327	.284	.791–2.225
Incisional hernia	.910	.779	.470–1.762
Umbilical hernia	.273	.715	.393–1.302
Surgical approach	.047	<.001	.023–.097

Table 2 Pathology results of hernia sac specimens sent for abnormal findings

Case	Type and approach	Indication	Pathology result
1	Laparoscopic incisional hernia	Discolored tissue	Benign lymph node
2	Laparoscopic inguinal hernia	Enlarged lymph nodes	Benign lymph nodes
3	Open inguinal hernia	Firm cystic structure	Benign adipose tissue
4	Open umbilical hernia	Strangulated hernia sac	Benign hernia sac
5	Open umbilical hernia	Necrotic mass	Benign adipose tissue
6	Open inguinal hernia	Hernia sac with mass, nerve	Benign lymph node, peripheral nerve, hernia sac
7	Open inguinal hernia	Hernia sac with mass	Benign hernia sac, lymph node
8	Open inguinal hernia	Hernia sac with nodule	Calcified fat, benign connective tissue
9	Open inguinal hernia	Cystic structure	Dense hernia sac with benign cyst

pathologic examination that showed malignancy and no results that led to a change in management of any of patient in which the specimen was sent. The estimated cost to the patient is $300 to $350 for pathologic microscopic evaluation and a total cost of $75,000 to $87,000 over the course of this study.

Comments

Pathologic evaluation of inguinal hernia sacs has been well studied within the pediatric population; however, data are lacking in the adult literature. The results from our study indicate that "routine" evaluation of hernia sac specimens is likely neither indicated nor cost effective. Over 4 years, with more than 1,200 hernia repairs, only 20% of these cases had specimen sent for evaluation, and 96% of those specimens were sent for routine evaluation. No specimen, routine or for abnormal intraoperative findings, returned a result that led to a change in clinical management of the patient.

The majority of the literature pertaining to this practice has focused on pediatric inguinal hernia repairs. This practice is routinely performed because of the concern that excision of the hernia sac may cause an inadvertent vas deferens or epididymis injury; thus, the pathological examination serves to confirm the presence of a sac only and no iatrogenic injury to adjacent structures. Recently, the standardization of this practice has been questioned, as the reported incidence of injury is extremely low (.1% to .4%).[6–8] Proponents of specimen evaluation note that there is a late presentation of clinically significant infertility in men of reproductive ages, most of which are many years removed from their hernia surgery, and have argued that evaluation of the sac may be necessary for surgical quality assurance and the potential to identify those that may require early intervention.[9,10] Given these findings, many pediatric institutions now employ a policy that the pathologists will grossly examine the specimen and only perform a microscopic examination if abnormalities are discovered.

The indications for the pathological examination of hernia sacs in adults are very different than their pediatric counterparts, as structures in most cases are more easily identified and complications such as infertility present sooner. In this study, abnormal intraoperative findings were the impetus for specimen evaluation in less than 4% of our cases. Furthermore, the majority of specimens evaluated were done so following repairs performed using an open approach, with less than 5% from laparoscopic procedures. This is likely because of the ease of resecting the sac in an open procedure, whereas excision may not occur during a laparoscopic procedure. The results from pathologic evaluation did not change management of the patient for either cohort, nor were there any injuries that were found in the specimens. Another factor that must be considered (especially in the absence of utility) is the substantial cost to the healthcare system over time without benefit, which was greater than $75,000. This figure also neglects the added burden of specimen evaluation for the pathologists.

There are weaknesses to this study that must be acknowledged. This study is retrospective and there was no standardized approach for reporting the indications for specimens in operative reports, leaving researchers to interpret those reports. The data were collected retrospectively from operative reports as well as medical records and their completeness was solely dependent on the providers present at the time of their care. Despite these limitations, we were able to determine the outcomes of routine examination of hernia sacs in a large cohort of patients.

In summary, these data reflect previous results from the pediatric surgical literature and as well support the notion that routine pathologic evaluation of hernia sac specimens is not indicated. Furthermore, there is a substantial monetary cost to the healthcare system as well as consumption of valuable resources. Finally, we should emphasize that this applies to routine evaluation alone, and concerning intraoperative findings should continue to be an indication for pathologic evaluation at the individual surgeon's discretion.

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Discussion

Dr O. N. M. Panton: Surgery is often steeped in tradition and the authors have sought to challenge the merit of routine pathologic evaluation of adult hernia sacs. This practice dates back in the USA to a 1926 ACS recommendation "that all tissues removed at operation shall be examined and reports rendered thereon."

The Canadian Agency for Drugs and Technologies in Health addressed the issue of routine ordering of primary pathology examinations in Canada in a 2014 publication.[1] Provincial and territorial regulations outlining requirement for human tissues removed by surgery or curettage to be sent to a laboratory for examination were identified for 8 of the13 provinces. Specimens commonly listed as exempt include fingers, hernia sacs, haemorrhoids, prepuces, teeth, toes and tonsils.

This is a retrospective review of all inguinal, incisional and ventral hernia sacs from 2007 to 2012 at the Madigan Army Medical Centre in 1,216 adult patients. The majority of specimens were inguinal hernia repairs and most went to pathology on a routine basis. The pathology report did no change patient care and costs were estimated as high as $87,000.00.

The authors address the issue of routine pathologic exam of paediatric hernia sacs due to the possibly of diagnosing occult vas deferens or epididymis injuries. Reference 7 in the manuscript is a publication from the University of Ottawa reporting their experience with pathologic examinations in 2,287 boys and 441 girls. In 2,657 hernia sacs in boys only 2 (.08%) had epididymal-like tubules. The annual institutional costs for routine exams were CD $7,100.00 concluding that routine hernia sac pathologic evaluation was unnecessary.

Wang et al reviewed the University of Toronto experience with 1,426 hernia sacs. Malignancy was found in 3 of 800 inguinal hernias (.37 %) and 7 of 576 abdominal wall hernias (1.2%) concluding that abdominal and femoral hernias should be submitted for pathologic examination.[2] The authors of the paper under discussion do not mention a diagnosis of malignancy simply stating that pathologic diagnosis did not alter management despite the fact that 44.65% of specimens were abdominal wall hernias.

Questions:

Was malignancy found in any sac specimen in your series?

Do you think selective pathologic evaluation on the part of the Surgeon outweighs the risk of missing malignancy?

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