

Analysis of the Clinical Significance and Cost Associated With the Routine Pathological Analysis of Pediatric Inguinal Hernia Sacs

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Study received institutional review board approval.

Purpose: Pediatric inguinal and scrotal surgeries for inguinal hernia, cryptorchidism and hydrocele are common and usually involve the excision of a hernia sac. Groups at many centers send hernia sacs for pathological analysis to identify occult disease as well as structures that may have been erroneously resected. We hypothesized that, since the incidence of significant findings is low and the associated health care costs are significant, the routine pathological analysis of inguinal hernia sacs is unnecessary.

Materials and Methods: After receiving institutional review board approval we retrospectively reviewed pathology reports at our institution of patients who underwent surgery with an inguinal hernia sac sent for pathological analysis from January 2000 to September 2009. The primary outcome was to determine the incidence of clinically significant structures in hernia sac specimens. The secondary outcome was to evaluate the costs associated with analyzing these specimens.

Results: A total of 2,287 boys and 441 girls underwent some form of inguinal or scrotal surgery during the study. In the 2,287 boys a total of 2,657 hernia sac specimens were analyzed, of which 2 (0.08%) contained clusters of epididymal-like tubules. Most unexpected findings were likely clinically insignificant, including mesothelial proliferation in 5.6% of cases, genital duct remnants in 0.8%, lipoma in 0.23% and adrenocortical rests in 0.04%. The average cost of analyzing hernia sac specimens at our institution was approximately \$7,100 Canadian annually.

Conclusions: Routine analysis of inguinal hernia sacs is unnecessary and costly, and should be reserved for cases in which resection of important structures such as the vas deferens is suspected.

Key Words: testis; ovary; hernia, inguinal; pathology; cost-benefit analysis

SURGERIES for inguinal hernia, undescended testis and hydrocele are among the most commonly performed operative procedures in children. Congenital indirect inguinal hernias have an incidence rate of 0.8% to 4.4% in childhood and they are 10 times more common in boys than in girls.¹ Hydroceles are commonly associated with

these hernias but they also occur in isolation as structures that communicate or do not communicate with the peritoneal cavity. Cryptorchidism is the most common congenital anomaly found at birth, affecting up to 4.6% of full-term male newborns.² The incidence rate decreases to 1.5% at age 1 year due to spontaneous testicular

descent but many patients go on to surgical correction.² The operative rate for orchiopexy was approximately 1.39% of all live male births in 1 statewide study.³

Surgical dissection in the pediatric inguinal or scrotal region can be meticulous and often involves excision of a hernia sac. There is a potential risk of damage to important neighboring structures, such as the spermatic cord, epididymis and testis, which can lead to significant morbidity, including testicular loss and infertility. Intraoperative injury is fortunately rare. In a large series of inguinal hernia repair Tiriyaki et al reported a low complication rate, including vas deferens injury in 0.2% of cases and iatrogenic orchiectomy in 0.1%.⁴

Groups at many centers in North America, including our institution, which is a tertiary care pediatric hospital, have routinely sent inguinal hernia sacs for pathological analysis to confirm whether important structures were inadvertently resected. Tissue is also sent to identify occult disease, such as malignancy.⁵ The handling of surgically resected tissues is usually mandated by regional health authorities. At our institution we are required to submit hernia sac specimens according to the Ontario Ministry of Health Public Hospitals Act.⁶

We determined whether this routine practice is medically necessary by determining the incidence of significant pathological findings in inguinal hernia sac specimens as the primary outcome, and evaluating the cost associated with processing and analyzing these specimens at our institution as the secondary outcome.

MATERIALS AND METHODS

Ethical approval for this retrospective study was obtained from the institutional review board. Pathological reports of inguinal hernia sac specimens were reviewed for the period from January 2000 to September 2009. Surgeons at our institution have routinely sent hernia sac specimens for pathological analysis. Thus, we identified all consecutive patients who underwent a procedure with resultant excision of an inguinal hernia sac.

Inguinal hernia sacs obtained from children (age 18 years or less) who underwent some form of inguinal or scrotal operation, such as inguinal herniorrhaphy, orchiopexy or hydrocelectomy, were included in the final analysis. Hernia sacs obtained from noninguinal regions and specimens with an incomplete pathology report were excluded from study. Four urologists and 3 general surgeons, each fellowship trained in pediatrics, from the department of surgery at our institution performed the operations during the study period. Five pediatric pathologists at the department of pathology at our institution reported all surgical gross and microscopic tissue findings.

Primary Outcomes

Pathological findings were categorized as normal, mesothelial proliferation, genital duct structures, gonads, torsion injury, ectopic tissue, neoplasm or miscellaneous.⁵ Significant pathological findings were studied further by reviewing the patient hospital chart with particular attention to the operative report to determine whether the injury or abnormality was identified before submitting the surgical specimen. Corresponding patient gender and age, procedure type and operative side(s) (left, right or bilateral) were documented from each pathological report. Generally all inguinal hernia sac specimens received are analyzed grossly and microscopically at our institution.

Secondary Outcomes

To determine the cost of 1 inguinal hernia sac specimen we accounted for the material and processing fees to prepare the specimen as well as the pathologist remuneration fee based on current year (2010) estimates in Ontario, Canada. Unfortunately prior year values could not be obtained. The total cost of analyzing all specimens in the study was based on this calculated estimate in Canadian dollars, equal to \$0.95 United States at the time of this report. Pathological specimens were prepared and analyzed according to standard protocol with hematoxylin and eosin staining, and examination under light microscopy.

RESULTS

We analyzed the records of the 2,287 boys (83.8%) and 441 girls (19.3%) who underwent surgery during the study period of January 2000 to September 2009 at our institution (table 1). This resulted in a total of 3,171 procedures at which inguinal hernia sacs were obtained since 443 patients underwent bilateral repair. Excluded from study were 18 hernia sac specimens due to absent microscopic descriptions. However, the gross descriptions of these specimens were reported to be normal.

Mean \pm SD patient age was 4.2 ± 4.4 years (range 1 month to 18 years) (table 1). In boys 84.5%, 8.4% and 7.1% of hernia sacs were obtained by inguinal herniorrhaphy, inguinal orchiopexy and

Table 1. Clinical variables

	Overall	Boys	Girls
No. pts	2,728	2,287	441
Age:			
Mean \pm SD (yrs)	4.2 \pm 4.4	4.1 \pm 4.4	5.2 \pm 4.5
Range	1 Mo–17.9 yrs	1 Mo–17.9 yrs	1 Mo–17.7 yrs
No. procedures (%):	3,171 (100)	2,657 (100)	514 (100)
Rt side	1,865 (58.8)	1,549 (58.3)	316 (61.5)
Bilat	443 (14.0)	370 (13.9)	73 (14.2)
Procedure type:*			
Inguinal herniorrhaphy	2,759 (87.0)	2,245 (84.5)	514 (100)
Inguinal orchiopexy	223 (7.0)	223 (8.4)	0
Hydrocelectomy	189 (6.0)	189 (7.1)	0

* No other type was found.

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