ORIGINAL ARTICLE

EXPLORATION OF THE CONTRALATERAL GROIN IN PAEDIATRIC INGUINAL HERNIA OR HYDROCELE BASED ON ULTRASOUND FINDINGS – IS IT JUSTIFIED?

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Background: Routine exploration of contralateral side in cases of unilateral inguinal hernia or hydrocele is a highly debatable topic because of various reasons. The purpose of this study was to analyse whether the contralateral groin exploration in unilateral inguinal hernia/ hydrocele is justified or not, based on ultrasonographic measurements of the inguinal ring diameter. **Methods:** This cross-sectional study was conducted at two naval hospitals, PNS Rahat and PNS Shifa in Karachi, Pakistan, from June 2007 to Aug 2012. Children presenting with unilateral inguinal hernia or hydrocele were included in the study. Ultrasound examination of the contralateral, apparently normal, groin was carried out using a high-resolution 7.5–11 MHz linear array with the patients in supine position. Surgical exploration of the contralateral groin was carried out in those children in whom the diameter of the inguinal canal at the internal ring was 4.5 mm or greater. All those children in whom the contralateral exploration was not done were followed up to 2 years. **Results:** A total of 287 patients completed the study, including 264 (92%) boys and 23 (8%) girls. In 242 (84%) cases, the mean diameter of internal ring on contralateral (clinically uninvolved) side was 3.5±0.4 mm, considered negative. Out of these 13 (5.4%) cases, however, proved to be false negative after a follow up of two year. There were 45 (16%) cases that underwent contralateral exploration on basis on positive ultrasound findings; 25 (55.6%) were hernias and 14 (31.1%) were hydroceles. In the remaining 6 (13.3%) cases surgical exploration failed to demonstrate hernia or PPV. **Conclusion:** Contralateral exploration in children with unilateral inguinal hernia or hydrocele, based on ultrasonographic findings, is not only cost effective but can also prevent unnecessary routine contralateral explorations and complications related to inguinal hernias.

Keywords: Inguinal hernia; Patent process vaginalis; Hydrocele; Contralateral exploration; Ultrasonography; Internal ring diameter

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INTRODUCTION

To explore or not to explore the contralateral side in children presenting with unilateral hernia or hydrocele has been debated repeatedly in the literature and continues to be an unanswered question. Many surgeons have routinely explored the contralateral inguinal canal; an approach considered highly controversial.[1–3] Clinical diagnosis of inguinal hernia or a hydrocele, resulting from a patent processus vaginalis (PPV), is usually straightforward. This is, however, not always the case, especially where the swellings relegated to these are transient in appearance, the history of the parent's lacks clarity or if the child is obese. Routine exploration of the contralateral side based on the presumed high incidence of PPV results in a very large number of negative explorations, perhaps 80–90%.[3] Many techniques, such as laparoscopy, herniography, diagnostic pneumoperitoneum and probing have been used for detecting contralateral pathology, thus avoiding unnecessary surgery. The results and routine applicability of these procedures remain questionable.[4–6] Recently ultrasonography has gained considerable popularity.[7–9] The purpose of this study was to analyse whether the contralateral groin exploration in unilateral inguinal hernia/ hydrocele is justified or not, based on ultrasonographic measurements of the internal ring diameters.

MATERIAL AND METHODS

This cross-sectional study was conducted at two naval hospitals, PNS Rahat and PNS Shifa in Karachi, Pakistan, from June 2007 to Aug 2012. Prior approval of the Research Ethics Committee was obtained and there was no conflict of interest. A total of 287 patients including 264 male and 23 female patients, with ages ranging from0.5 to 132 months, completed the follow up. Only those presenting with clinically demonstrable unilateral inguinal hernia or hydrocele were included in the study, while excluding patients with demonstrable bilateral inguinal hernias or hydroceles, those who had already undergone surgery for hernia on one

side, recurrent cases and those with known pathological causes, i.e., mucopolysaccharidosis and abdominal wall defects. A pro forma was initiated for each patient with a record of age, sex, side of hernia, ultrasound findings of both ipsilateral and the contralateral, unaffected, groin. Ultrasound examination was carried out using a high resolution 7.5–11 MHz linear array with the patients in supine position. It was considered positive, i.e., suggestive of inguinal hernia or PPV, if the maximum observed diameter of the inguinal canal at the internal ring was 4.5 mm or more (Figure-1) The ultrasound positive, but clinically uninvolved, contralateral groins were explored and the operative findings recorded. Children presenting with hydroceles were generally operated upon after 18 months of age. A few cases, however, presenting with tense hydroceles causing discomfort were operated earlier. The children presenting with inguinal hernias were operated upon electively as soon as possible.

An informed and written consent was taken from the parents for ipsilateral surgery as well as for contralateral surgery where ultrasound findings were suggestive of hernia or PPV.

A modified Ferguson repair of hernia was performed in all cases. A transverse incision was made in the lowest inguinal skin crease above the external inguinal ring of the affected side. Scarpa's fascia was incised and the external oblique aponeurosis was exposed and traced laterally to the inguinal ligament. The external oblique was opened in the long axis of its fibres. The ilioinguinal nerve was isolated and cremaster muscle fibres separated on anteromedial surface of the cord to expose the glistening peritoneum of the indirect hernial sac.

The sac was elevated anteromedially and the spermatic vessels along with the vas were gently cleared away. The hernia sac was divided between clamps and the upper end dissected superiorly to the level of the internal (deep) inguinal ring. The neck of sac was finally transfixed at deep ring after excluding sliding component, especially in females. The same procedure was repeated on the contralateral side on patients with a positive ultrasonography finding. The wound was then closed in layers. Presence or absence of the PPV or hernia was recorded.

All those patients, in whom the contralateral side was not explored, i.e., with negative ultrasound, were followed up at 6-monthly for a minimum of two years, especially for the appearance of a contralateral demonstrable inguinal hernia or hydrocele. In those cases, where the follow up was inconvenient the parents were requested to inform through phone call, text message or email if their child had subsequently developed a hernia or a hydrocele on the opposite side. Data was analyzed using SPSS version 17.

RESULTS

A total of 287 patients completed the study, including 264 (92%) boys and 23 (8%) girls. Among the boys, 119 (45.1 %) presented with inguinal hernia whilst the remaining 145 (54.9 %) had hydroceles; and of the 23 girls, 21 (91.3%) had hernias and 2 (8.7%) hydroceles. In total, there were 140 (48.8 %) hernias (93 right sided and 47 left sided) and 147 (51.2%) hydroceles (92 right sided and 55 left sided), making a total175 (61%) right sided and 112 (39%) left sided cases. The mean age of children presenting with hernias was 27.4±26.3 months (range 0.5–132 months) and for children with hydrocele mean age was 47.4±28.1 months (range 12–120 months).

In 242 (84%) cases, the mean diameter of internal ring on contralateral (clinically uninvolved) side was 3.5±0.4 mm, the range being 2.8–4.4 mm. These cases were considered negative for PPV or hernia on ultrasound examination and were not explored contra-laterally. Out of these 13 (5.4%) cases, however, proved to be false negative after up to two years of follow up as these patients developed clinically demonstrable contralateral hernia or hydrocele. There were 45 (16%) cases that underwent contralateral exploration on basis on positive ultrasound findings; 25 (55.6%) were hernias with mean diameter of 9.0±1.9 mm (range of 5–11 mm); 14 (31.1%) were PPV with mean diameter of 6.8±1.3mm (range 4.5–8 mm). In the remaining 6 (13.3%) cases surgical exploration failed to demonstrate hernia or PPV, suggesting false positivity on ultrasound examination (Table-1).

Ultrasonography for the detection of contralateral hernia or PPV has a sensitivity of 75% (0.75) and specificity of 97% (0.97) with positive predictive value of 86.7% (0.867) and negative predictive value 94.6% (0.946) for inguinal hernia in children less than 12 years of age (Table-2).

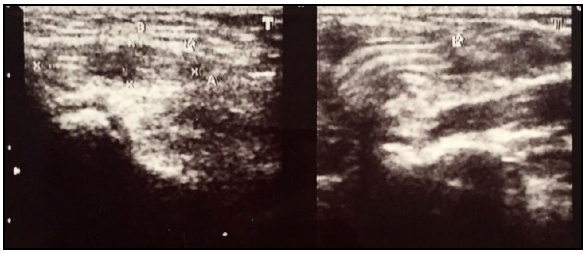

Figure-1: Ultrasound of the right groin of a 2-year old boy who presented with a left inguinal hernia. The diameter of the inguinal canal of the apparently uninvolved right groin was 5.2 mm. This was considered a positive ultrasound. The child's right groin was also explored and a PPV was found.

Table-1: Summary of statistical data and analysis

	Contralateral PPV or hernia		Total
	Absent	Present	
Positive Ultrasound	6	39	45
Negative Ultrasound	236	6	242
Total	242	45	287

Table-2: Results

Sensitivity	75%
Specificity	97%
Positive predictive value	0.867 (86.7%)
Negative predictive valve	0.946 (94.6%)

DISCUSSION

Routine surgical exploration of the contralateral inguinal canal, in children presenting with unilateral inguinal hernia or hydrocele, leads to an unacceptably high rate of negative surgical explorations. Meta-analysis has shown that the risk of metachronous hernia in infants and children is 7.6%; gender, age and prematurity are not significant risk factors.[10] The policy of only operating on the other side once these conditions become clinically apparent is generally the course of action followed in most paediatric surgical centers. In Pakistan, however, majority of the population resides in rural areas where immediate access to healthcare facilities can be difficult. For children already diagnosed with unilateral involvement it would be worthwhile screening for contralateral PPV or hernia and dealing with both sides at the same time. In the past various techniques, such as herniography, diagnostic pneumoperitoneum and laparoscopy, have been tried but have not been used as a routine in our set up because of the difficulty, availability or invasiveness of the procedures. Ultrasonography, on the other hand, is a safe and non-invasive diagnostic imaging technique that can be used for this purpose. Various ultrasonographic criteria have been used for this purpose. In one of the methods the findings of ultrasonography are classified as follows.[11]

Type-I: Detection of a herniated intra-abdominal viscous in the inguinal canal with increment and decrement of the intra-abdominal pressure.

Type-II: The presence of a cyst like structure at the internal ring.

Type-III: The PPV and the inguinal canal are widened with abdominal pressure increment (the length of the PPV is longer than 20 mm and the width of the internal ring is more than 4 mm in diameter).

Type-IV: The PPV contains moving material without enlargement.

Type-V: The PPV widens with increase of abdominal pressure.

Type-VI: Other findings.

Our preferred method has been to use the diameter of the internal ring with 4.5 mm as the cut off point. The therapeutic decision eventually taken was whether to explore or not, based on diameter of the canal at the internal ring, so the other ultrasonographic findings were irrelevant. The maximum observed diameter was recorded as there is a slight variation depending whether the child is supine or relaxed (not crying) or whether the child is standing or crying (straining). We have not found the need to use age related dimensions, as there is very little variation in the diameter, as opposed to the length, of the normal inguinal canal in the prepubertal child. We used 4.5 mm as the cut off point as using lower values, between 3.8–4.0 mm, results in increased sensitivity but reduced specificity.[12] We feel that measuring only the maximum observed diameter at the internal ring rather than specifying the various types of ultrasonographic findings, as listed above, makes the ultrasound imaging more objective and perhaps eliminates some of the bias due to skill and experience of the operator.

Our results suggest that ultrasound examination of the contralateral groin has a very high specificity (97% with positive predictive value of 86.7%) and negative predictive value 94.6% (0.946) for inguinal hernia in children less than 12 years of age. Many authors have reported high accuracy and minimal complications of using laparoscopy to look for contralateral PPV others, however, report contradictory results suggesting that higher costs and complications do occur.[9,13] Herniography and diagnostic pneumoperitoneum are invasive procedures and several complications including hematoma and bowel perforation have been reported.[14]

Ultrasound examination, on the other hand, is non-invasive, easily repeated, and reasonably reliable way of looking for contralateral PPV or inguinal hernia. Toki *et al* showed that the incidence of negative exploration before and after application of ultrasonography in diagnosis of contralateral hernias 10.2% and 1.5% respectively and this difference was statistically significant.[12]

CONCLUSION

Contralateral exploration in children with unilateral inguinal hernia or hydrocele, based on ultrasonographic findings, is not only cost effective but can also prevent unnecessary routine contralateral exploration and complications related to inguinal hernias.

AUTHORS' CONTRIBUTION

SHZ: Conceptualization of study design. JUR: Write-up and data collection/analysis. TSS: Performed/supervised all ultrasound studies carried out on the subject patients. HUR: Proof reading. NH, MOF: Data Collection.

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