Selective Use of Intraoperative Pneumoperitoneum for Detection of Contralateral Inguinal Hernia in High Risk Children: Goldstein’s Test Revisited

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Background/Purpose: Contralateral exploration (CLE) in children with unilateral inguinal hernias is still controversial. Various methods have been devised to assess the presence of contralateral patent processes vaginalis in order to rationalize the contralateral exploration. This study evaluates the selective use of the intraoperative pneumo-peritoneum technique in detecting the contralateral hernia in high-risk children.

Patients and Methods: A retrospective analysis of two groups of children who underwent repair of unilateral inguinal hernias was done. Analysis included three subgroups at high-risk of developing contralateral hernia, namely, females, left side hernias, or children less than two years of age. In group I (n=126 patients), the intraoperative pneumo-peritoneum technique was not performed with the repair, in group II (n=14 patients), the test was performed using the Goldstein technique.

Result: In group I, 28 children presented with left-side hernias, two of them (7%) developed right-side hernias later on. Twelve were females, one of them (8%) developed contralateral hernia. Another 37 patients were less than two years, two of them (5%) developed contralateral hernia during the follow-up period. In group II, the intraoperative pneumo-peritoneum technique was performed in 14 cases; all with left-sided hernia. Eight females (57%), and 7 less than two years of age (50%). None of these showed signs of contralateral patent processus vaginalis and accordingly no contralateral exploration was performed. No contralateral hernia developed during the follow up period. The difference in the incidence of contralateral hernia between the groups was statistically insignificant (P values > 0.05).

Conclusion: The intraoperative induced pneumo-peritoneum is a valuable technique to detect the associated contralateral hernias. It is simple to perform, less invasive, less time consuming and inexpensive. Selective use in high-risk children is advised.

Index Words: Inguinal hernia, contralateral hernia, processus vaginalis, pneumoperitoneum
INTRODUCTION

Contralateral exploration (CLE) in infants with symptomatic unilateral inguinal hernias is still a controversial issue. A patent processus vaginalis (PPV) in the apparently normal side may be found in up to 60% of term infants, and in even greater number of preterm infants.\(^1\) This fact has been used to justify routine CLE, especially in infants.\(^2\) Many surgeons believe that CLE should be done routinely in girls, especially when less than 2 years of age or with left-sided hernias, where the risk of developing contralateral hernia (CLH) is 24%.\(^3\) There is a belief that CLH is more likely when the initial hernia is on the left side, presumably due to the fact that primary hernias are more common on the right.\(^4,5,6,7,8\)

On the other hand, when the symptomatic side was repaired without CLE, only 10% to 30% of children subsequently developed CLH.\(^9\) This created major objection to routine CLE, as in the majority of cases (85%-90%) it would logically be unnecessary.\(^10,11\) Therefore, various methods have been devised to identify the presence of PPV, in order to decide whether or not to proceed with CLE. Some are performed preoperatively, as herniography and ultrasonography,\(^12,13\) others are intraoperative tests, as probing of the contra-lateral side,\(^14\) intraoperative pneumoperitoneum (IOPP),\(^15,16\) as well as laparoscopy.\(^17,18\)

The aim of this study was to evaluate the selective use of the intraoperative pneumoperitoneum technique during inguinal hernia repair in detecting the contralateral hernia in high-risk children.

PATIENTS AND METHODS

This study is a retrospective analysis of two groups of children who underwent repair of unilateral inguinal hernias. Analysis included three subgroups at high-risk of developing CLH, namely, females, left side hernias, or children less than two years of age. Between August 2002 and July 2004, the author undertook 138 inguinal hernia repairs. Of these, twenty females (14.5%), 42 with left-sided hernias (30%) and 44 (31.8%) under the age of 2 years at the time of repair were selected for the study. Age ranged between 7 days and 13 years. No preoperative tests were performed. Group [I] included children who underwent repair with no intraoperative tests to detect CLH (no IOPP). Group [II] included children who underwent repair and IOPP. In this group, following dissection and identification of the hernia, the target sac was used to insufflate the abdominal cavity with CO\(_2\). The contralateral side was then examined for swelling or crepitus.\(^15\) Follow up ranged from 6-30 months and subsequent appearance of CLH was compared. Statistical analysis was undertaken using the Chi-Square test. A \(p\) value of less than 0.05 was considered significant.

RESULTS

In group I, two (7%) of the 28 children with left-side hernias (28) developed right-side hernias. Of 12 females, one (8%) developed CLH and of the 37 cases with age less than two years, two cases (5%) developed CLH. During the follow-up period. In group [II], IOPP was performed in 14 cases; all with left-sided hernias, 8 females (57%) and 7 less than 2 year of age (50%). None of the 14 showed signs of contralateral PPV and accordingly no CLE was performed. No CLH developed the follow up period (Table I). The difference in the incidence of CLH between the groups was statistically insignificant (P values > 0.05).

| Table 1: The incidence of contralateral hernia per risk-factor |
|-----------------|-----------------|-----------------|---|
| Risk factor     | Group I (No IOPP) | Group II (IOPP) | P  |
|     No.        |   CLH (No. %)    |    CLH (No. %)  |   |
| Females       | 12   1 (8%)      |     8     0     | 0.69|
| Lt side hernia| 28   2 (7%)      |    14    0     | 1.03|
| Age<2 years   | 37   2 (5%)      |     7     0     | 0.37|

CLH: Contra-lateral hernia, IOPP: Intra-operative pneumoperitoneum, No.: number of patients, Lt: left

DISCUSSION

The processus vaginalis (PV) develops during the third month of gestation as an out-pouching of the peritoneal cavity through the internal ring. It obliterates spontaneously from the internal ring to the testis after completion of the testicular descent. The
PPV is a potential hernia; only when some part of the abdominal viscera is inside, it will be called an actual hernia.\(^\text{19}\)

In unilateral hernias, the incidence of contralateral PPV ranges from 63% in the first 2 months of life to 41% after the age of two years.\(^\text{20}\) The overall risk of developing a clinical CLH seems to be 10% to 15% with reports ranging from one percent to 34%.\(^\text{21,22,23}\)

Although routine CLE is not justified, according to most authors, overlooking other side hernia is a big burden to the baby, its family and the resources. Even with the recent improvements in anesthetic care, pain control and with adopting a one-day surgery policy, a second operation is surely never welcomed. Therefore, to rationalize CLE, various methods have been devised to identify the contralateral PPV in unilateral hernias. Preoperative herniography entails injecting a contrast into the peritoneal cavity followed by an X ray study to search for PPV.\(^\text{12}\) The technique is clearly invasive, and doing it prior to surgery adds an extra burden on the baby, its family as well as the resources.

Toki et al studied the ultrasonographic appearances of the PV in 117 neonates. They classified it into 6 types starting with the appearance of intraabdominal viscus inside the PPV to PPV of less than 20mm. Classification is subjective and operator-dependent which reflects the difficulty in interpreting the findings.\(^\text{24}\) However, The accuracy of sonographic diagnosis was reported to be as high as 92% by some authors.\(^\text{13}\) It must be remembered though, that some of them (as types I, II) were those who could be diagnosed clinically anyway.

With the advent of laparoscopy, there has been an increasing interest in direct visualization of the contralateral internal ring at the time of hernia repair. Standard laparoscopic CLE is usually performed through the ipsilateral groin with an angled scope or through the umbilicus with a 0 degree scope.\(^\text{18}\) Yet, the definition of what constitutes a hernia or just a PPV is still to be clarified, and it certainly needs experience. Peritoneal webs or veils sometimes make the laparoscopic interpretation difficult. Nixon et al, in their laparoscopic examination of 1500 cases, showed numerous internal ring variations.\(^\text{17}\) In case of unclear laparoscopic view, some surgeons would probe the contralateral side to determine a patent PV.\(^\text{25,26}\) Others introduce another scope via the contralateral side for better views.\(^\text{27}\) Though accurate in detecting contralateral hernias, adding laparoscopy to inguinal hernia repair will definitely complicate a relatively simple technique. Also, it is a resource burden for such a very common and relatively minor procedure.

In our study, we found the IOPP a simple, safe and rapid technique to perform. It added only few minutes to the operative time with no intraoperative or postoperative complications. Clinical interpretation of the contralateral crepitus or swelling was easy. The accuracy of detecting CLH was excellent and no false negative results were recorded. Although one of the oldest tests (originally devised by Goldstein in the late fifties of the last century\(^\text{16}\) it is still a highly useful test, especially when selectively used in children with high risk factors for CLH, namely, in infants less than two years, cases presented clinically with left sided hernias and in females.

**CONCLUSION**

The Intraoperative pneumoperitoneum test seems to be an easy guide to whether or not to proceed with contralateral exploration during inguinal hernia repair. It is simple to perform, less invasive, less time consuming and inexpensive. Its selective use in high-risk children is a good strategy; to avoid complicating one of the most commonly performed procedures by the pediatric surgeon.

**REFERENCES**


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