# Profile of Contralateral Patent Processus Vaginali in Pediatric Patients with Unilateral Inguinal Hernia

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## Abstract

**Objective**: Reporting the incidence of contralateral patent processus vaginali (CPPV) in pediatric patients with unilateral inguinal hernia. **Methods**: The study was conducted from November 2010 - February 2012. Patient's identity were recorded for registration number, name, age, gender, address and date of examination. The surgery was conducted by a trainee pediatric surgeon as a researcher and resident. High ligation procedure and diagnostic of contralateral PPV. **Results**: This study included 40 pediatric patients of various ages diagnosed with lateral inguinal hernia. There were 31 male patients (77.5%), 24 patients (60%) with right inguinal hernia patients, and 14 patients (35%) aged 0-1 years. **Conclusion**: The transinguinal laparoscopic contralateral PPV technique is helpful in diagnosing the presence of contralateral PPV. The incidence of contralateral PPV in this study was 27.5%. Furthermore, early age increased the incidence of contralateral PPV.

***Keywords:*** *laparoscopic transinguinal technique, Patent Processus Vaginali, unilateral inguinal hernia,*

## Introduction

Inguinal hernia surgery is the most frequent procedure performed by pediatric surgeons, and is a frequent case that referral patient consult to pediatric surgeons[(1)]. Most children have unilateral hernia. Only a small proportion have metachronous contralateral hernias[(2)].

Lateral inguinal hernia in children arises because of the delay or failure of closure of peritonei processus vaginalis known as the Patent Processus Vaginalis (PPV). Abnormalities of the closure of the processus vaginalis can cause various kinds of disorders including lateral inguinal hernia, communicating or non-communicating hydrocele funiculli, testicular hydrocele, cryptorchidism. The incidence rate of lateral inguinal hernias in infants or children is 1-4.4%, in which it is mostly found in boys than girls, and 10-15% are bilateral[(3)].

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The diagnosis of inguinal hernia in children can be enforced based on clinical conditions, namely anamnesis in the form of a lump in the groin, especially when the patient cries or strains, and disappears when the patient sleeps. Moreover, a silk glove sign appears on physical examination. Examination of the silk glove sign is difficult because it depends on the examiner's experience. Therefore, this causes a less accurate diagnosis of PPV based on physical examination, especially on the contralateral side[(4, 5)].

Contralateral hernia in the future will cause higher disadvantages, twice the risk of anaesthetics, and doubled parental anxiety and patient's stress level. Some investigators undertake routine contralateral exploration to avoid those disadvantages. However, there are several harms reported regarding contralateral exploration, including the risk of testicular injuries and vas deferens, prolonged operative duration and negative exploration[(6)].

Over the past 60 years, contralateral inguinal exploration procedure in pediatric patients with unilateral lateral inguinal hernia is still under debate. Since 1950, there have been many reports on how should

contralateral inguinal exploration be indicated because of the contralateral PPV. Pediatric surgeons can take many options to treat PPV[7]. First, observing and correcting should clinical symptoms of inguinal hernia appear[8, 9]. Second, a routine contralateral inguinal exploration during unilateral inguinal hernia repair surgery[9, 10]. Third, performing a contralateral exploration only if the PPV is found per laparoscopy during unilateral inguinal hernia surgery. Fourth, only performing selective contralateral exploration in preterm infants, low birthweight and significant anaesthetic risk[2].

Based on these considerations, the decision to explore contralateral has been preceded by several attempts to diagnose the presence of contralateral PPV[11]. Some of preoperative examinations are intra-operative pneumoperitoneum (Goldstein test), herniography, ultrasonography and laparoscopy[4]. Laparoscopic technique has grown rapidly as a diagnostic tool to look for the presence of contralateral hernia or PPV, while at the same time prevents the second surgery and is a minimally invasive technique[12-14].

This study was conducted to explore the benefits of transinguinal laparoscopy in patients undergoing unilateral inguinal hernia surgery by a single surgeon and to identify the presence of a contralateral PPV in children of various ages.

## Methods

The population of this study were all patients undergoing lateral inguinal hernia surgery at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, from November 2010 to February 2012. The samples of this study were pediatric patients of unilateral inguinal hernia [15, 16] who met the inclusion and exclusion criteria. Inclusion criteria included children ≤ 12 years who suffered from unilateral inguinal hernia and patients who had never had hernia surgery, either left or right. Exclusion criteria included lateral inguinal hernia patients with comorbid diseases such as ascites, hydrocephalus post VP shunt, gastroschisis, sex anomalies, support muscle tissue disorders, incarcerated lateral inguinal hernia patients, and bilateral inguinal hernia patient (duplex).

All unilateral inguinal hernia patients who would undergo high ligation procedure from November 2010 to February 2012 who met the inclusion and exclusion criteria were included in the study. Patient's identity was recorded including register number, name, age, gender, address and date of examination. The surgery was conducted by a trainee pediatric surgeon as a researcher and resident. High ligation procedures and contralateral PPV diagnostics were carried out in accordance with standard surgery procedures applicable at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia. The surgical procedure includes when the hernia sac is opened, the probe is attached and tied so that compressed abdominal air does not come out, and a laparoscopy camera is inserted with a 30-degree lens unruly peeking at the PPV counterpart [17].

The research was conducted at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, from November 2010 to February 2012. Data were collected from samples and processed as descriptive data. Statistical analysis was carried out using IBM SPSS Statistics software version 23.0 (IBM Corp., Armonk, NY, USA).

## Results

This study included 40 pediatric patients of various ages diagnosed with lateral inguinal hernia, with 31 male patients (77.5%), 24 patients (60%) with right inguinal hernia (Figure 1), and 14 patients (35%) aged 0-1 years (Table 1 & 2).

**Table 1. Basic research data**

| Basic Data | n (%) | cPPV |
|---|---|---|
| Sex | | |
| Male | 31 (77.5) | 8 (25.8) |
| Female | 9 (22.5) | 3 (33.3) |
| Location of Inguinal Hernia | | |
| Right | 24 (60) | 8 (33.3) |
| Left | 16 (40) | 3 (18.7) |
| Age | | |
| 0-1 year | 14 (35) | 5 (35.7) |
| 1-3 year | 10 (25) | |
| 3-6 year | 10 (25) | 3 (30) |
| 6-12 year | 6 (15) | 3 (30) |
| | | 0 (0) |

**Table 2. Results Distribution of CPPV Locations by Age Group**

| Age | cPPV | |
|---|---|---|
| | + | - |
| 0-1 year | 5 (35.7) | 9 (64.3) |
| 1-3 year | 3 (30) | 7 (70) |
| 3-6 year | 3 (30) | 7 (70) |
| 6-12 year | 0 | 6 (100) |

## Discussion

In this study, the highest incidence of lateral inguinal hernia was found in male participants (31; 77.7%), which is in accordance with previous literatures. The incidence of lateral inguinal hernia in men is 4–6 times that of women[3, 18-20]. Other studies stated the ratio of men: women 3: 1 and 10: 1. However, there was no significant gender difference in the group of preterm infants[4].

Participants in this study mostly had right inguinal hernia (60%), which is in accordance with previous studies that approximately 60% of hernias occur on the right side. This condition was found in both men and women due to the slower process of closing the processus vaginal[10].

From age distribution, the incidence of lateral inguinal hernia was mostly found on the age group of 0-1 year (35%), followed by 1-3 year (25%) and 3-6 year (25%). The incidence decreased at over 6 years old (15%). There were 11 cases of contralateral PPV or 27.5% for all ages, contrary to the finding of Rothenberg and Barnet that stated that the incidence of <1 year contralateral hernia was 100% and 68.5% for ages >1 year[2]. However, the finding of this study is closer to the results of previous studies that pointed out 14-41% incidence of contralateral hernias[21]. Unlike previous studies that only mentioned the incidence of contralateral

hernias at 11%, this study had a nearly double higher result[2, 4, 10].

The graph above showed that contralateral PPV incidence mostly occurred in cases of right lateral inguinal hernia (20%), while the left side was only 7.5%. A study conducted by Surana and Puri found that the incidence rate of contralateral hernia was 10.3% in infants aged 1 week to 6 months, while patients with left hernia who developed right hernia was 16.6%[10, 22]. Meanwhile, previous study conducted for 20 years found that 41% of patients with left inguinal hernia would experience future right inguinal hernia, whereas only 14% of patients with right inguinal hernia would develop left inguinal hernia[21]. Compared with the two studies, this study found that the incidence of contralateral PPV in cases of right hernia was higher. This finding could become a consideration that in cases of unilateral lateral inguinal hernia, diagnostics must first be performed prior conducting contralateral exploration[23].

This study found that transinguinal contralateral laparoscopy was very helpful in diagnosing contralateral abnormalities. Therefore, appropriate action could be taken at the time of the first surgery, as well as knowing the certainty of contralateral PPV to reduce morbidity due to negative contralateral exploration. The disadvantages of this surgery require more expensive costs and a relatively longer time.

## Conclusions

The transinguinal technique of contralateral PPV is very helpful in diagnosing the presence of contralateral PPV. The incidence of contralateral PPV in this study is 27.5%. Moreover, early age increased the incidence of contralateral PPV. There are no complications of laparoscopic procedures, even though this technique has a higher surgery costs and relatively longer surgery time.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Ethical Approval:** All procedures performed in studies involving human participants were in accordance with the ethical standards of the Ethics Committee in Dr. Soetomo General Academic Hospital, Surabaya, Indonesia.

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