

# Incidence of pediatric metachronous contralateral inguinal hernia in children aged $\geq 1$ year

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**Background:** The management of the contralateral asymptomatic side when a child with initial unilateral inguinal hernia undergoes herniorrhaphy continues to be controversial. Age less than 6 months at initial herniorrhaphy is considered as a high risk factor of the occurrence of metachronous contralateral inguinal hernia (MCIH). We performed herniorrhaphy for patients  $\geq 1$  year with initial unilateral hernia at one-day-set outpatient-surgery department without any intervention of contralateral groin. In this study, we reviewed the characteristics of development of MCIH in this condition and discuss the management strategies of MCIH.

**Methods:** The subjects of this study were children who were treated at our outpatient-surgery department from January 2006 to December 2006. A total of 2129 patients with initial unilateral hernia and aged  $\geq 1$  year underwent an ipsilateral herniorrhaphy only. Patients were followed up for the development of MCIH to 60 months. The Chi-square test was used for intergroup comparison, a level of  $P < 0.05$  was considered as statistically significant.

**Results:** Among these children 1341 (63.0%) were obtained 60 months follow-up data, 1146 (85.5%) were boys and 195 (14.5%) were girls. MCIH developed in 70 (5.2%) patients, 61 were boys and 9 were girls. In 570 patients aged 12-23 months, 43 developed MCIH (7.5%); in 564 patients aged 24-59 months, 21 developed MCIH (3.7%); and in 207 patients  $\geq 60$  months, 6

patients developed MCIH (2.9%), the difference between these groups was highly significant ( $P = 0.004$ ). In male patients, 30 right-sided MCIHs occurred after 423 initial left-sided herniorrhaphies (7.1%) and 31 left-sided MCIHs occurred after 723 initial right-sided herniorrhaphies (4.3%), difference between these two groups was significant ( $P = 0.041$ ). Seventy-seven percent of the MCIHs occurred within 1 year, 94% occurred within 2 years after initial herniorrhaphy.

**Conclusions:** As the overall incidence of MCIH in patients aged  $\geq 1$  year was 5.2%, routine contralateral groin exploration is not suggested. Transinguinal laparoscopy could be considered as an alternative of conventional "wait and see" policy, especially in patients less than 2 years or left-sided initial unilateral inguinal hernia. If "wait and see" policy is adopted, patients should be closely followed up for 2 years.

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**Key words:** contralateral patent processus vaginalis; inguinal hernia; transinguinal laparoscopy

## Introduction

Inguinal herniorrhaphy is the most common procedure in pediatric surgery but management of the contralateral asymptomatic side in children with initial unilateral inguinal hernia undergoing herniorrhaphy is controversial.<sup>[1-3]</sup> The major concern is the development of metachronous contralateral inguinal hernia (MCIH). Young age of patients at initial herniorrhaphy is considered as a high risk factor for the occurrence of MCIH, especially in infants less than 6 months of age.<sup>[4-10]</sup> At our institute, we performed herniorrhaphy for patients  $\geq 1$  year with initial unilateral hernia in one-day-set outpatient-surgery department without any intervention of the contralateral groin. In this study, we reviewed the characteristics of development of MCIH in this condition and evaluated the efficacy of this treatment. This study was undertaken to determine the incidence of MCIH in children who

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underwent unilateral hernia repair at one year of age or older, and its relation to gender, age and the initial side of hernia, and to discuss the management strategies of the contralateral asymptomatic side.

## Methods

The study subjects were children who were treated at our outpatient surgery department from January 2006 to December 2006. Only patients with initial unilateral hernia and aged  $\geq 1$  year were included. Patients  $< 1$  year of age or with a history of prematurity were admitted to the inpatient department and laparoscopic method was used for them. Children with incarcerated hernia, recurrent hernia or a comorbid disease such as cystic fibrosis were all admitted to inpatient department and excluded from this study.

Herniorrhaphies were performed under caudal anesthesia. The inguinal hernia sac was ligated on the symptomatic side without any intervention of the contralateral side. Briefly, a small transverse dermatoglyphic incision (usually 1-1.5 cm) was made after anesthesia, and then Scarpa's fascia was spread. The external oblique was kept intact and the cord was identified near the external ring. After the sac was identified and opened, a forefinger was inserted into the sac, and the cord and vessels were bluntly separated with gauze toward the neck of the sac. Then the sac was doubly ligated and the incision was closed with one single suture. The whole procedure including anesthesia could be finished within 20 minutes. Patients were followed up for the development of MCIH. Follow-up data were obtained by medical records, operation records, telephone contacts and mail survey. The Chi-square test was used to compare the incidence of MCIH in patients with or without a given attribute (gender, side of initial herniorrhaphy, and age of initial herniorrhaphy). Data were presented as mean $\pm$ SD;  $P < 0.05$  was considered statistically significant.

This study was approved by the Institutional Review Board of Children's Hospital, Zhejiang University School of Medicine.

## Results

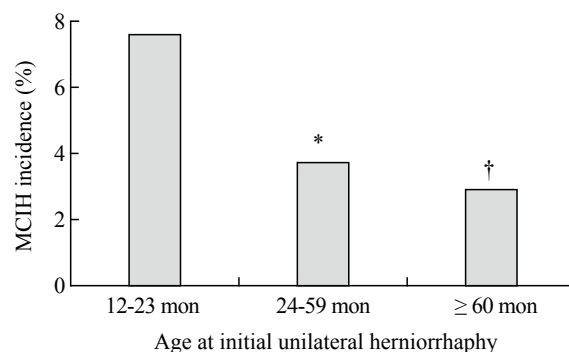
A total of 2129 patients underwent initial herniorrhaphy at our department during the course of study. In these children, 60-month follow-up data were obtained from 1341 (63.0%) and included in statistical analysis. Of the 1341 patients, 1146 (85.5%) were boys and 195 (14.5%) were girls, with age ranging from 12 months to 11 years (24.9 $\pm$ 15.4 months) at the time of initial herniorrhaphy.

MCIH developed in 70 (5.2%) patients, including 61 boys and 9 girls. Between two sexes, there was no significant difference in the incidence of MCIH (61/1146 vs. 9/195,  $P=0.681$ ).

To identify the relation between MCIH and the age of initial herniorrhaphy, a sub-set analysis was performed according to the age of initial herniorrhaphy. In 570 patients aged 12-23 months, 43 developed MCIH (7.5%); in 564 patients aged 24-59 months, 21 developed MCIH (3.7%); and in 207 patients  $\geq 60$  months, 6 developed MCIH (2.9%). The difference between these groups was highly significant ( $P=0.004$ ) (Fig. 1). Totally, the incidence of MCIH in patients aged  $\geq 24$  months was 3.5%; compared with the 12-23 months age group, the difference was significant ( $P=0.001$ ).

Overall, 34 right-sided MCIHs occurred after 523 initial left-sided herniorrhaphies (6.5%) and 36 left-sided MCIHs occurred after 818 initial right-sided herniorrhaphies (4.4%). There was no significant difference in these two groups (34/523 vs. 36/818,  $P=0.092$ ). Though, in male patients, 30 right-sided MCIHs occurred after 423 initial left-sided herniorrhaphies (7.1%) and 31 left-sided MCIHs occurred after 723 initial right-sided herniorrhaphies (4.3%), comparison between these two groups revealed a significant difference ( $P=0.041$ ) (Table).

The mean interval of MCIH after initial herniorrhaphy was 7.7 $\pm$ 11.1 months (range: 4 days to

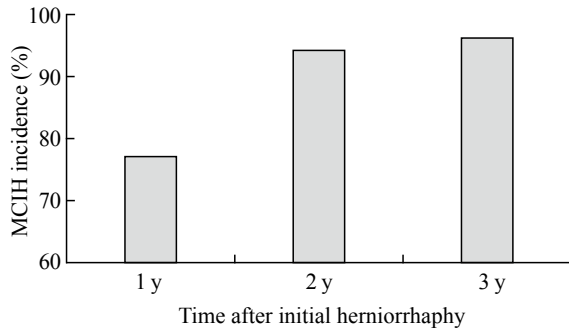


**Fig. 1.** The incidence of metachronous contralateral inguinal hernia (MCIH) compared to the patient age range. \*:  $P < 0.01$ , compared with 12-23 months age group; †:  $P < 0.05$ , compared with 12-23 months age group.

**Table.** The incidence of metachronous contralateral inguinal hernia (MCIH) compared to the laterality of the initial inguinal hernia

	Left-sided unilateral hernia		Right-sided unilateral hernia		P value
	Total	MCIH	Total	MCIH	
All patients	523	34	818	36	0.092
Male	423	30	723	31	0.041*
Female	100	4	95	5	0.177

\*:  $P < 0.05$ , chi square test.



**Fig. 2.** The incidence of metachronous contralateral inguinal hernia (MCIH) compared to years after initial unilateral herniorrhaphy.

57 months). Seventy-seven percent of MCIHs occurred within 1 year, 94% occurred within 2 years, and 96% occurred within 3 years (Fig. 2).

## Discussion

In this study, we found that 1) The overall incidence of MCIH in children  $\geq 1$  year was 5.2%, and there was no significant difference between girls and boys; 2) Young age ( $< 2$  years) was a high risk factor for the development of MCIH, even in a group of only children  $\geq 1$  year. Another high risk factor was male gender with initial left-sided unilateral inguinal hernia; 3) Most MCIHs developed within 2 years after initial herniorrhaphy.

Since over 3000 patients with inguinal hernia are treated every year in our institute, an efficient and safe system is required. Studies<sup>[4,5,10]</sup> have shown that age of less than 6 months at the first unilateral herniorrhaphy is a high risk factor for the development of MCIH. Thus, at our institute we adopt the "wait and see" policy and no intervention is given to patients  $\geq 1$  year with unilateral hernia in the one-day-set outpatient-surgery department. With this strategy, more than 20 herniorrhaphies can be performed in the outpatient-surgery department every day. The reported overall incidence of pediatric patients developing MCIH following a unilateral herniorrhaphy is 5.76%-7.2%.<sup>[4,11,12]</sup> Comparatively, we have reduced the incidence after implementation of our strategy. This strategy might be suitable for the situations that too many patients need to be treated in some developing countries with very limited medical resource.

With the overall incidence of 5.2%, our strategy could not be considered successful. Several studies<sup>[4,8,10]</sup> also reported an age of less than 2 years at the first unilateral herniorrhaphy was a high risk factor for MCIH. This was confirmed by our study. Further analysis demonstrated that young age at initial unilateral herniorrhaphy was a high risk factor for MCIH in this  $\geq 1$  year study cohort. The incidence of

MCIH in children who underwent the first unilateral herniorrhaphy in less than 2 years was significantly higher than that in patients of  $\geq 2$  years old (7.5% vs. 3.5%,  $P=0.001$ ). Thus, if possible, "no intervention given to children aged  $\geq 2$  years" might be more reasonable than our strategy.

Another high risk factor of MCIH that we addressed in this study is the laterality of initial unilateral hernia. Clinical presentation of inguinal hernia occurs more frequently on the right side than on the left side,<sup>[4,13]</sup> but evidence shows that left-sided initial unilateral hernia is more likely to have a MCIH than right-sided initial hernia.<sup>[4,10,12,14-16]</sup> In this study, the overall incidence of left-sided initial hernia based MCIH was higher than that of right-sided initial hernia based MCIH (6.5% vs. 4.4%), though there was no significant difference. In male patients, the incidence of left-sided initial hernia based MCIH was significantly higher than that of right-sided initial hernia based MCIH (7.1% vs. 4.3%,  $P=0.041$ ).

Since Rothemberg and Barnett<sup>[17]</sup> reported all infants under 1 year of age and 65.8% of children over 1 year of age were found to have hernias on both sides during exploration in 1955, the controversy of the necessity of bilateral exploration during the repair of unilateral inguinal hernias in children has lasted over 50 years.<sup>[9,18-20]</sup> In this study, we do not think the low incidence of MCIH justifies the routine exploration of the contralateral groin in children with unilateral inguinal hernia, even in our high incidence group.

With the advancement of minimally invasive techniques, transinguinal laparoscopy has been used for evaluation of the contralateral groin.<sup>[21-23]</sup> Recently, this technique has been considered as a simple, accurate, and effective method to assess the contralateral processus vaginalis.<sup>[24-27]</sup> However, it is still questioned by some researchers that laparoscopy can identify a patent processus vaginalis yet we do not know whether it will develop into a clinical inguinal hernia.<sup>[10,28]</sup> Currently, the "wait and see" policy is still used in most services of pediatric surgery.<sup>[27]</sup> According to our data, we think the "wait and see" policy might be more suitable for children of  $\geq 2$  years old, other techniques like transinguinal laparoscopy should be considered in our pediatric practice, especially in patients with high risk factors such as an age of less than 2 years or existence of left-sided initial unilateral hernia. In addition, if the "wait and see" policy is adopted, patients should be closely followed up for 2 years, because most MCIHs developed within 2 years after initial herniorrhaphy.

In conclusion, as the overall incidence of MCIH in patients of  $\geq 1$  year old was 5.2%, routine exploration of the contralateral groin is not suggested. Transinguinal

laparoscopy could be considered as an alternative to the conventional "wait and see" policy, especially in patients of less than 2 years old or those with left-sided initial unilateral inguinal hernia. If the "wait and see" policy is adopted, patients should be closely followed up for 2 years.

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**Competing interest:** None.

**Contributors:** Wang JH wrote the manuscript, Zhao ZY designed this study and others involved in follow-up study and data collection.

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