



## Incidence of Metachronous Inguinal Hernia among Children under One Year of Age in Pediatric Surgery

Hussain Gadelkarim Ahmed<sup>1\*</sup>, Muhannad Saud A. Alshammari<sup>1</sup>, Jamal Ahmed Abdullah Al Marshadi<sup>1</sup>, Mohammed Salem Jaber Wadani<sup>2</sup>, Muteb Nasser Alawd<sup>1</sup>, AbdulRahman Ali AbdulRahman AlSogair<sup>1</sup>, and Abdullah Fahad Abdullah AlGharbi<sup>1</sup>

<sup>1</sup> College of Medicine, University of Hail, Hail, Saudi Arabia

<sup>2</sup> College of Medicine, Prince Sattam Bin Abdulaziz University, Al-Kharj, Saudi Arabia

\*Corresponding e-mail: [hussaingad5@gmail.com](mailto:hussaingad5@gmail.com)

### ABSTRACT

**Background:** Pediatric inguinal hernia is one of the frequent causes of childhood morbidity. Therefore, the aim of the present study was to determine the incidence of metachronous contralateral inguinal hernia in pediatric patients aged  $\leq 12$  months, in Northern Saudi Arabia. **Methodology:** In the present study, records of a series of 90 pediatric patients (aged  $\leq 12$  months) were presented with inguinal hernia and have subsequently undergone inguinal hernia repair. **Results:** About 2/30 (6.6%) with left side hernia were found with subsequent right side metachronous contralateral inguinal hernia (MCIH) occurrence. One out of the two 1/2 (50%) was found at the age of 2 months, the other one 1/2 (50%) was at the age of 6 months. The 3/54 (5.5%) with right inguinal hernia developed a contralateral hernia, of whom 2/3 (66.6%) were found at the age of 12 months, and one 1/3 (33.3%) was at the age of 2 months. **Conclusion:** The findings of the present study suggest that there is a relatively higher incidence of contralateral inguinal hernia if the initial presentation was on the left side, which necessitates a close follow up for those patients; however, there is not enough evidence to support routine exploration of the contralateral groin surgically.

**Keywords:** Inguinal hernia, Pediatric, Contralateral hernia, Saudi Arabia

### INTRODUCTION

A pediatric inguinal hernia is one of the frequent causes of childhood morbidity with estimated incidence rates ranging from 1% to 4% [1]. The incidence of Metachronous contralateral inguinal hernia (MCIH) ranges from 6% to 10% [2-4]. Higher incidence of MCIH was observed among younger patients if the initial hernia was on the left side [5].

An inguinal hernia is a bulge of abdominal-cavity constituents through the inguinal canal. Symptoms are existent in around 66% of patients. The most frequent symptoms comprise pain or discomfort mainly with coughing, exercise, or bowel movements. Usually, it becomes worse all over the day and recovers when lying down. A bulging area may turn out to be bigger when bearing down. Inguinal hernias happen more frequently on the right than left side. The main worry is strangulation, where the blood supply to a part of the intestine is obstructed. This commonly produces severe pain and tenderness of the area [6].

Following unilateral inguinal hernia repair, some patients experienced a Contralateral inguinal hernia (CIH) this necessitates consequent surgical repair. Earlier studies have revealed that  $\leq 30\%$  of patients develop CIH [7]. The management of the contralateral asymptomatic side when a child with initial unilateral inguinal hernia undergoes herniorrhaphy continues to be controversial. An age of fewer than 6 months at initial herniorrhaphy is regarded as a great risk factor for the occurrence of MCIH. As the inclusive prevalence of MCIH in patients aged  $\geq 1$  year was 5.2%, routine contralateral groin exploration is not proposed [8].

However, there are no reports from Saudi Arabia regarding MCIH, therefore, the aim of the present study was to determine the incidence of MCIH in pediatric patients (aged  $\leq 12$  months), in Northern Saudi Arabia.

## MATERIALS AND METHODS

In the present study, records of a series of 90 pediatric patients (aged  $\leq 12$  months) presented with inguinal hernia had subsequently undergone inguinal hernia repair were revised. Archives related to all patients selected between 2015 and 2017 were retrieved from the pediatric surgical unit at King Khalid hospital in Hail, Northern Saudi Arabia. Follow-up records, complications and outcomes were recorded. Demographical characteristics including age and gender were also recorded.

### Ethical Consent

Our study protocol was conformed according to the 2013 Declaration of Helsinki and this study was approved by the ethics committee of the College of Medicine, University of Hail, Saudi Arabia.

### Data Analysis

Statistical analysis was performed using statistical package for social science (SPSS) software (version 16.0, SPSS Inc., Chicago, IL, USA). Categorical variables were given as frequencies and percentages, and continuous variables. For all statistical comparisons, a p-value lower than 0.05 was considered statistically significant.

## RESULTS

The present study included 90 children, their ages ranging from 1 month to 12 months with a mean age of 6.6 months. Out of 90 patients, 65/90 (72.2%) were males and the remaining 25/90 (27.8%) were females, giving males' females' ratio of 2.60: 1.00. The majority of patients attended at the age of 12 months constituting 17/90 (19%), followed by age of 2 months and 1 month, representing 12/90 (13%), and 9/90 (10%), respectively, as indicated in Table 1 and Figure 1. For males, most of them attended at age of 12 months followed by age of 2 months and 1 month, constituting 15/65 (23%), 10/65 (15.4%) and 7/65 (10.8%), respectively. For females, most of them attended at age of 10 months followed by age of 8 months and 7 months, constituting 6/25 (24%), 4/25 (16%) and 3/25 (12%), correspondingly, as indicated in Table 1 and Figure 1. With regard to the nationality, most of the patients were Saudi representing 86%.

**Table 1 Distribution of patients by age, nationality, and sex**

Variable	Category	Males	Females	Total
Age (month)	1	7	2	9
	2	10	2	12
	3	6	0	6
	4	5	0	5
	5	1	2	3
	6	6	2	8
	7	5	3	8
	8	3	4	7
	9	4	1	5
	10	1	6	7
	11	2	1	3
	12	15	2	17
	Total		65	25
Nationality	Saudi	54	23	77
	Non-Saudi	11	2	13
	Total	65	25	90

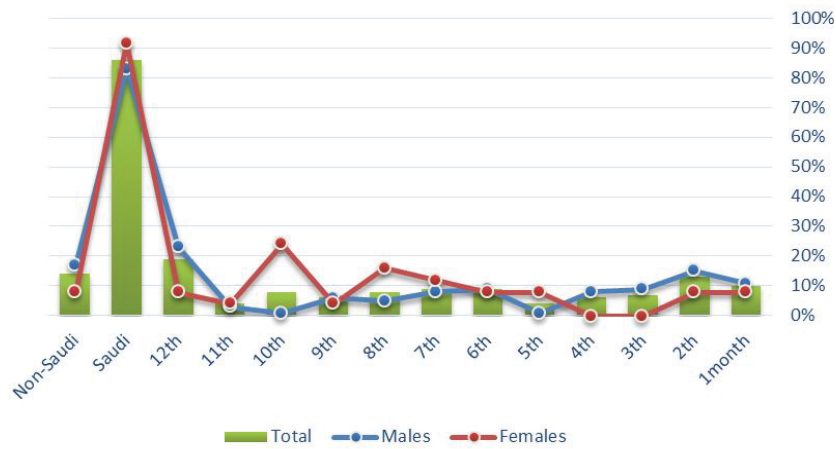


Figure 1 Description of patients by age, nationality, and sex

The majority of the patients attended with right side hernia followed by left and bilateral representing 54/90 (60%), 30/90 (33.3%) and 6/90 (6.6%), in this order. An inguinal hernia is significantly found in the right side ( $p < 0.05$ ). Most of the males and females were also found with right side hernia, as indicated in Table 2 and Figure 2. With regard to complains, the great majority of patients attended with inguinal swelling representing 89/90 (98.9%). Contralateral explorations were never performed. The subsequent contralateral occurrence was identified in 2/30 (6.6%) of those with left side hernia. Out of the 2 patients, 1/2 (50%) was male and 1/2 (50%) was female, about 3/54 (5.5%) of the right side hernia patients developed CIH, all of them were males. Herniotomy represented the most frequently done operation followed by herniotomy with hydrocelectomy and herniotomy with circumcision constituting 87/90 (97%), 2/90 (2.2%) and 1/90 (1.1%), correspondingly, as shown in Table 2 and Figure 3. The initial outcomes were the improvement of all patients, as indicated in Table 2.

Table 2 Distribution of the study population by a hernia

Variable	Category	Males	Females	Total
Side of hernia	Right	36	18	54
	Left	24	6	30
	Bilateral	5	1	6
	Total	65	25	90
Complains	Inguinal swelling	64	25	89
	Scrotal swelling	1	0	1
	Total	65	25	90
Operation	Herniotomy	62	25	87
	Herniotomy with hydrocelectomy	2	0	2
	Herniotomy with circumcision	1	0	1
	Total	65	25	90
Contralateral exploration	Yes	0	0	0
	No	65	25	90
	Total	65	25	90
Outcomes	Improved	65	25	90
	Not-improved	0	0	0
	Total	65	25	90
Contralateral occurrence	Yes	4	1	5
	No	61	24	85
	Total	65	25	90

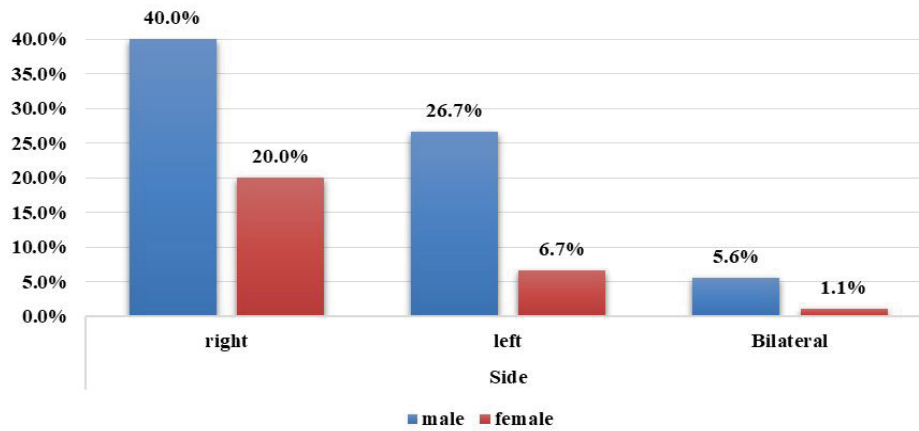


Figure 2 Description of the patients by side

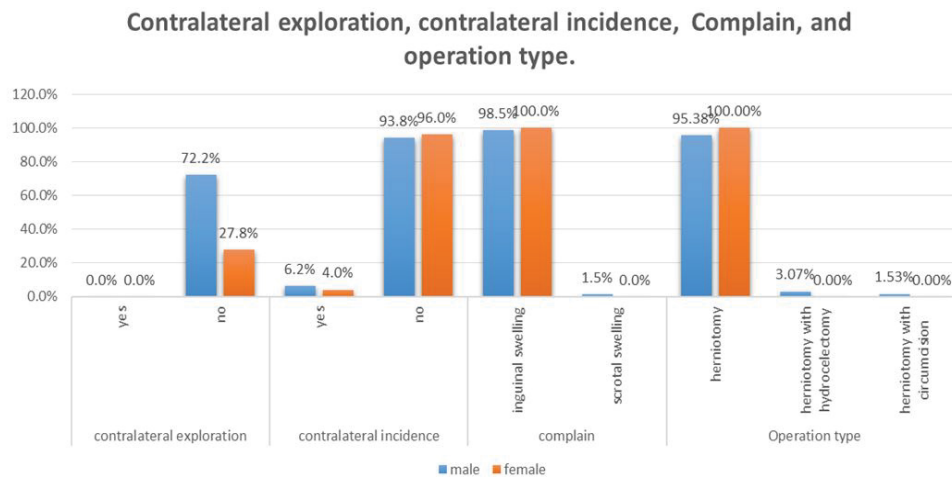


Figure 3 Description of the patients by contralateral exploration, contralateral incidence, complain, and operation type

With regard to the relationship between age and the side of the hernia, the majority of cases were detected at age >9 months and <3 months, followed by 6-9 months, representing 27/90 (30%), 27/90 (30%), and 20/90 (22.2%) in this order, as indicated in Table 3 and Figure 4. No cases were contralaterally explored. About 2/30 (6.6%) with left side hernia was found with subsequent right side contralateral occurrence, out of the 2, one was at the age of 2 months and the other one was at 6 months. Regarding right side contralateral incidence, out of the 3, 2/3 (66.6%) were found at the age of 12 months, and one 1/3 (33.3%) was at the age of 2 months, as shown in Table 3 and Figure 4.

Table 3 Distribution of the study population by age and hernia

Variable	Category	<3 months	3-6 months	6-9 months	>9 months	Total
Side of hernia	Right	16	8	12	18	54
	Left	8	6	8	8	30
	Bilateral	3	2	0	1	6
	Total	27	16	20	27	90
Contralateral exploration	Yes	0	0	0	0	0
	No	27	16	20	27	90
	Total	27	16	20	27	90
Contralateral occurrence	Yes	2	1	0	2	5
	No	25	15	20	25	85
	Total	27	16	20	27	90

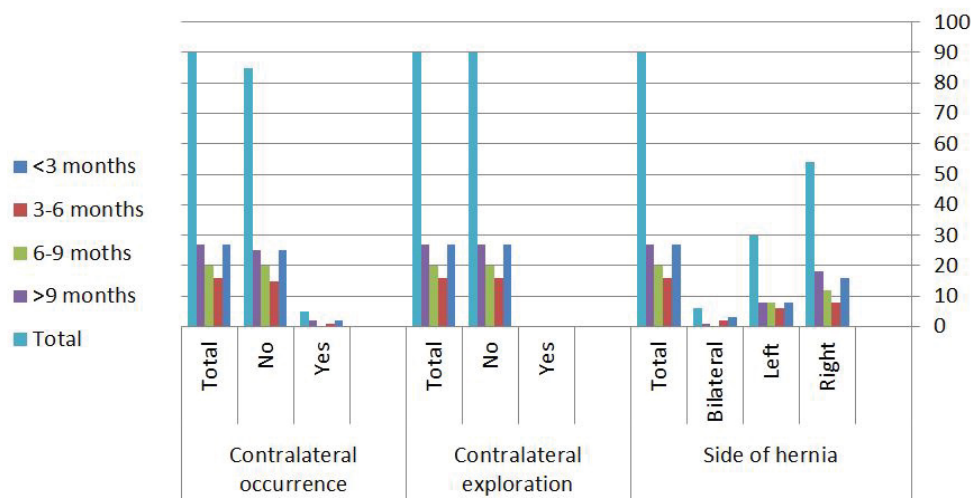


Figure 4 Description of the study population by age and hernia

## DISCUSSION

As inguinal hernias happen more frequent on the right than the left side, if its initial identification is in the left side, the right side should be examined and followed up. However, the right side is frequently missed when the initial hernia is on the left side. Thus the purpose of the present study was to review the prevalence of the contralateral inguinal hernia in a series of pediatric patients under the age of 12 months.

In the present study, most of the patients were detected with right hernia representing 60% compared to the left side, which revealed 33.3%. The condition was more frequent in males compared to females. Many previous studies have reported similar findings regarding sex, prevalence, and domination of right side [9-11].

In the current study, contralateral inguinal explorations were not performed. Although controversies still exist concerning the necessity for contralateral groin exploration when a unilateral inguinal hernia is existing, meanwhile the accurate incidence of contralateral patent processus vaginalis is still in the process [12]. The application of trans-inguinal ipsilateral laparoscopy for contralateral groin exploration in the course of unilateral inguinal hernia repair has increased acceptance. Debate exists, however, concerning its usage in older children. Trans-inguinal laparoscopic exploration is safe and effective and should be routinely implemented in pediatric patients of all ages as there is an increasing prevalence of contralateral hernia [13]. Nonetheless, controversy continues over the necessity to explore the asymptomatic contralateral groin in girls with a unilateral inguinal hernia. Contralateral exploration should be routinely done in girls with inguinal hernia until they reach 4 years of age [14]. Moreover, a contralateral inguinal hernia is very rare and commonly happens numerous years next to inguinal repair surgery in preterm girls. This should inspire physicians to follow these children all over childhood for the consequent occurrence of inguinal hernia [15].

In the present study, the incidence of the MCIH on the right side when the initial hernia was on the left side was 6.6%. Similar incidence rates were previously published. Despite a reported (8% to 22%) incidence of clinically unsuspected contralateral inguinal hernia, the likelihood of undergoing contralateral repair within 10 years is low at 3.8% [16]. In a series of patients experienced unilateral hernia repair, 96% were entirely followed-up for 36 months. About 6.7% of the patients with initial left side inguinal hernia have developed a contralateral hernia. Left-sided hernia (OR=5.5, 95%, CI=1.3-24.3, p=0.023) was associated with a high risk of contralateral hernia [17]. However, the routine contralateral inguinal exploration, without clinical evidence of a hernia, may be desirable in children with captivity and perhaps in premature infants. The low incidence of contralateral hernias in all other patients, irrespective of gender or age, does not justify routine contralateral exploration [18].

The present findings showed that most of those with a contralateral inguinal hernia underwent the initial hernia repair at an earlier age. Routine Contralateral inguinal exploration (CIE) in patients suffering from unilateral hernia is one of the most debated issues in pediatric surgery. This controversy began with the report published in the middle of fifties

of the past century reporting that in children with inguinal hernias, 100% of those younger than 1 year and 68.5% of those older than one year had bilateral hernias and the debate continues till now [19,20].

### CONCLUSION

Although, the findings of the present study suggest that there is a higher percentage of contralateral inguinal hernia if the initial presentation was on the left side, which necessitates the importance of close follow up and parent's education about the possibility of developing contralateral inguinal hernia after. Although it is more common to have a contralateral inguinal hernia after a while if it is first present in the left side, you should not neglect the left side if the patients present first with right side hernia as a small percentage developed CIH. However contralateral groin exploration is not recommended at this point due to the small percentage that will develop CIH.

### DECLARATIONS

#### Acknowledgement

Authors would like to thank people at the department of Surgery at King Khalid hospital, for their help in data collection.

#### Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### REFERENCES

- [1] Mollen, Kevin P., and Timothy D. Kane. "Inguinal hernia: what we have learned from laparoscopic evaluation of the contralateral side." *Current Opinion in Pediatrics*, Vol. 19, No. 3, 2007, pp. 344-48.
- [2] Alzahem, Abdulrahman. "Laparoscopic versus open inguinal herniotomy in infants and children: A meta-analysis." *Pediatric Surgery International*, Vol. 27, No. 6, 2011, pp. 605-12.
- [3] Ron, O., S. Eaton, and A. Pierro. "Systematic review of the risk of developing a metachronous contralateral inguinal hernia in children." *British Journal of Surgery: Incorporating European Journal of Surgery and Swiss Surgery*, Vol. 94, No. 7, 2007, pp. 804-11.
- [4] Lee, Cheng-Hung, et al. "Incidence of and risk factors for pediatric metachronous contralateral inguinal hernia: analysis of a 17-year nationwide database in Taiwan." *PloS One*, Vol. 11, No. 9, 2016.
- [5] Kokorowski, Paul J., et al. "Evaluation of the contralateral inguinal ring in clinically unilateral inguinal hernia: a systematic review and meta-analysis." *Hernia*, Vol. 18, No. 3, 2014, pp. 311-24.
- [6] Fitzgibbons Jr, Robert J., and R. Armour Forse. "Groin hernias in adults." *New England Journal of Medicine*, Vol. 372, No. 8, 2015, pp. 756-63.
- [7] Hay, Jean-Marie, et al. "Shouldice inguinal hernia repair in the male adult: The gold standard? A multicenter controlled trial in 1578 patients." *Annals of Surgery*, Vol. 222, No. 6, 1995, p. 719.
- [8] Wang, Jin-Hu, et al. "Incidence of pediatric metachronous contralateral inguinal hernia in children aged  $\geq 1$  year." *World Journal of Pediatrics*, Vol. 8, No. 3, 2012, pp. 256-59.
- [9] Bertozzi, Mirko, et al. "Laparoscopic herniorrhaphy in children." *La Pediatria Medica e Chirurgica*, 2015.
- [10] Ezomike, U. O., S. O. Ekenze, and C. C. Amah. "Irreducible inguinal hernias in the paediatric age group." *Nigerian Journal of Medicine*, Vol. 22, No. 3, 2013, pp. 230-33.
- [11] Wenk, Kathrin, et al. "Incidence of metachronous contralateral inguinal hernias in children following unilateral repair-A meta-analysis of prospective studies." *Journal of Pediatric Surgery*, Vol. 50, No. 12, 2015, pp. 2147-54.
- [12] Ehsan, Md Toufique, et al. "Laparoscopic hernioplasties in children: the implication on contralateral groin exploration for unilateral inguinal hernias." *Pediatric Surgery International*, Vol. 25, No. 9, 2009, pp. 759-62.
- [13] Lazar, David A., et al. "Transinguinal laparoscopic exploration for identification of contralateral inguinal hernias in pediatric patients." *Journal of Pediatric Surgery*, Vol. 46, No. 12, 2011, pp. 2349-52.

- [14] Zampieri, N., et al. "Contralateral exploration for unilateral inguinal hernia in females: Risk factors and surgical findings." *Hernia*, Vol. 12, No. 5, 2008, p. 511.
- [15] Demouron, Marion, et al. "Is contralateral inguinal exploration necessary in preterm girls undergoing inguinal hernia repair during the first months of life?" *Pediatric Surgery International*, Vol. 34, No. 11, 2018, pp. 1151-55.
- [16] Clark, Justin J., Whitney Limm, and Linda L. Wong. "What is the likelihood of requiring contralateral inguinal hernia repair after unilateral repair?." *The American Journal of Surgery*, Vol. 202, No. 6, 2011, pp. 754-58.
- [17] Hoshino, M., et al. "Prediction of contralateral inguinal hernias in children: A prospective study of 357 unilateral inguinal hernias." *Hernia*, Vol. 18, No. 3, 2014, pp. 333-37.
- [18] Tackett, Leslie D., et al. "Incidence of contralateral inguinal hernia: A prospective analysis." *Journal of Pediatric Surgery*, Vol. 34, No. 5, 1999, pp. 684-88.
- [19] Philip L. Glick and Scott C. "Boulanger: Inguinal hernias and hydroceles." *Pediatric Surgery*, Philadelphia, Pa) 7 Mosby, 2006, pp. 1172-92.
- [20] Hammad A, et al. "Emergency treatment approach and pathophysiology of burn related lung injury." *Clinical and Medical Reports*, Vol. 1, No. 4, 2018, pp. 1-3.