

# Study of Inguinoscrotal Swellings in Children using Clinical Assessment and Radiological Evaluation at a Tertiary Care Hospital

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## Abstract

**Introduction:** Inguinoscrotal swellings are one of the most common congenital anomalies observed in children majority of them being attributed to inguinal hernia and hydrocele. The main cause being patent processus vaginalis which fails to obliterate. Although clinical examination itself establishes the diagnosis in various inguinoscrotal swelling, ultrasonography (USG) is recommended as to rule out contralateral hernia and to prognosticate chances of developing hernia on the other side depending on the size of deep ring.

**Materials and Methods:** This study was conducted as an observational study on pediatric patients presenting with inguinoscrotal swelling in Department of Surgery, at our hospital during the study period. Detailed history and clinical examination of swelling was done followed by radiological evaluation using USG.

**Results:** A total of 53 patients fulfilling inclusion criteria were enrolled. The majority of children belonged to age range of 1–5 years (62.3%) and we observed male predominance in our study with male: female ratio of 12.3:1. USG findings revealed inguinal hernia in 39 (73.5%) children. Hydrocele and undescended testis was observed in USG in 11 (20.8%) and 3 (5.6%) of children, respectively.

**Conclusion:** Inguinal hernia does not resolve spontaneously and should be repaired as soon as possible to avoid the risk of incarceration or strangulation.

**Key words:** Hernia, Hydrocele, Inguinoscrotal swelling, Radiology, Ultrasonography

## INTRODUCTION

Inguinoscrotal swellings are one of the most common surgical problems in infancy and childhood worldwide. Among various causes, hydrocele and hernia are most common causes of inguinoscrotal swelling.<sup>[1]</sup> Inguinoscrotal swelling may also be due to other causes such as testicular torsion, epididymo-orchitis, retractile testis, undescended testis, inguinal lymphadenitis, paratesticular, and other

tumors in inguinal region.<sup>[2]</sup> Normally, testis descends in the inguinal region by approximately 28 weeks of gestation and then by 29 weeks, testis descends into the scrotum among males. Along with descent of testes, lining of peritoneum covering the testis extends into the inguinal canal and scrotum which is called processus vaginalis. However, in females, processus vaginalis extends into the labia majoris through the inguinal canal with descent of ovaries and is called canal of Nuck<sup>[3]</sup> The processus vaginalis closes spontaneously at the area of inguinal ring few weeks before birth or immediately after birth. Inguinal hernia in pediatric age group results due to patent processus vaginalis through which abdominal contents protrude into inguinal region.<sup>[2,3]</sup>

The reported incidence of hernia among infants varies from 1% to 4% and it can be as high as 30% among premature

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infants. Most common age of presentation of inguinal hernia among infants is within first 6 months of life.<sup>[4,5]</sup> The majority of inguinal hernia are unilateral among term infants whereas the majority of inguinal hernias among preterm neonates are bilateral.<sup>[2]</sup> Developmentally, the right testis descends late as compared to left testis and thus inguinal hernias among infants are more common on the right side. Unilateral hernias are more common in male infants whereas bilateral hernias are more common in female infants.<sup>[6]</sup> Other common cause of inguinoscrotal swelling is hydrocele which may be of three types, communicating, non-communicating, and hydrocele of cord. In case of communicating hydrocele, processus vaginalis is patent which allow movement of the fluid between peritoneal cavity and tunica vaginalis whereas in case of non-communicating hydrocele, obliteration of processus vaginalis occurs proximally.<sup>[7]</sup>

Usually, the hernias are asymptomatic but typically, the child may present with intermittent swelling in groin, scrotum, or labia which appear during crying, straining, and other activities causing increased intra-abdominal pressure and may disappear spontaneously or manually. Child may also present with vague, chronic sharp pain in groin which increases during the exercise.<sup>[8]</sup> Clinically, a child is assessed for appearance of inguinoscrotal swelling during crying or straining. Cord is palpated to determine its thickness which is called silk glove sign. Both the testis must be examined. Hydrocele may present as a translucent non-tender inguinal swelling.<sup>[8]</sup>

It is important to differentiate between different types of swelling as the management strategy for individual diagnosis differs. The diagnosis of swelling is based on history and clinical examination. However, in few cases, who present with history suggestive of hernia, but the examination reveals inconclusive findings, radiological investigations such as ultrasonography (USG), computed tomography, and magnetic resonance imaging play an import role. USG is a safe and inexpensive tool that may help in improving the diagnosis in case of inguinoscrotal swelling. Furthermore, it may be helpful in deciding the management strategy in case of inguinoscrotal swelling.<sup>[9]</sup> The present study was conducted at a tertiary care center to assess different types of inguinoscrotal swelling in children using clinical assessment and radiological evaluation at tertiary care center. Objectives of the study were to study the demographic pattern, clinical presentation, and radiological differentiation of inguinoscrotal swelling among children presenting at tertiary care hospital.

## MATERIALS AND METHODS

This study was conducted as an observational study on pediatric patients presenting with inguinoscrotal swelling

in Department of Surgery, People's Hospital Bhopal during the study period of 18 months, that is, from November 1, 2019 to April 30, 2021. All the patients with inguinoscrotal swelling, belonging to age range of 6 months–14 years and whose guardians consenting for the study, were included in the study. However, patients with exostrophy of bladder, prune belly syndrome, and intersex patients were excluded from the study. After obtaining ethical clearance from Institute's Ethical Committee, all the patients presenting at the study area during the study period with inguinoscrotal swelling belonging to age range of 1 day–14 years and fulfilling the inclusion criteria were included using purposive sampling. Written consent was obtained from the guardians. Data regarding sociodemographic profile such as age and gender were obtained from guardians and entered in pretested questionnaire. Detailed history regarding the inguinoscrotal swelling such as onset, duration, laterality, reducibility along with birth history, period of gestation, and family history was obtained and entered in questionnaire. History regarding presence of congenital anomalies was also enquired and entered in questionnaire. Detailed physical examination of swelling was conducted to assess the nature, type, and reducibility of swelling. Location of testis was also assessed to rule out undescended testes. Transillumination test was also done to establish the diagnosis. Furthermore, detailed general and systemic examination was conducted to assess the presence of associated congenital anomalies. All the patients were subjected to complete blood examination and other relevant investigations. Further, all the patients were subjected to radiological examination using USG to establish the accurate diagnosis and to assess associated congenital anomalies. Radiological examination was also done in case of unilateral presentation to rule out possibility of contralateral hernia.

## Statistical Analysis

Data were compiled using MsExcel and analyzed using IBM SPSS software version 20. Data were grouped and expressed as frequency and percentage whereas numerical data were expressed as mean and standard deviation. Appropriate statistical test was applied and  $P < 0.05$  was considered statistically significant.

## RESULTS

A total of 53 patients fulfilling inclusion criteria were enrolled. The majority of children belonged to age range of 1–5 years (62.3%) and we observed male predominance in our study with male: female ratio of 12.3:1. Out 53 children, 37 (69.8%) children were delivered at term whereas 16 (30.2%) were premature [Table 1].

**Table 1: Distribution according to the baseline variables**

Baseline variables	Frequency (n=53)	Percentage
Age		
<1	14	26.4
1–5	33	62.3
>5	6	11.3
Gender		
Male	49	92.5
Female	4	7.5
Period of gestation		
Preterm	16	30.2
Term	37	69.8

About 100% children in our study had swelling in inguinoscrotal region and 1 child (1.9%) had pain. About 58.5% children presented with swelling at inguinoscrotal region followed by 32.1% and 9.4% children with swelling at inguinal and scrotal region, respectively. In majority of the children (52.8%), the duration of swelling was found to be between 1 month and 1 year [Table 2].

USG findings revealed inguinal hernia in 39 (73.5%) children. Hydrocele and undescended testis was observed in USG in 11 (20.8%) and 3 (5.6%) of children, respectively [Figure 1].

Inguinal hernia was observed as a unilateral swelling in 37 (94.8%) cases out of 39 whereas it was bilateral in 2 (5.1%) cases only. However, swelling due to hydrocele (100%) and undescended testes (100%) was usually unilateral. In the present study, the observed association of inguinoscrotal swelling with laterality was found to be statistically insignificant ( $P > 0.05$ ). In the present study, we observed no significant association of diagnosis with laterality in both males and females ( $P > 0.05$ ). About three cases had associated epididymal cyst whereas renal agenesis was observed in one case [Table 3].

## DISCUSSION

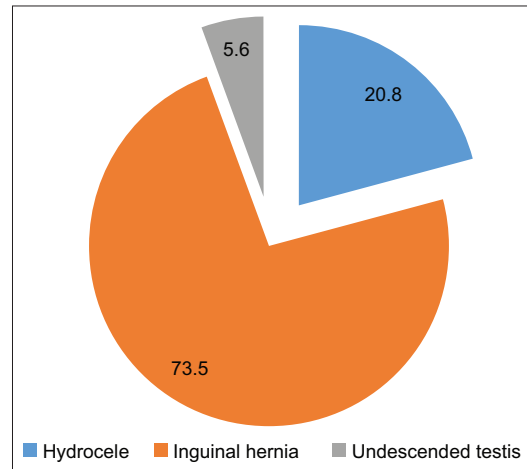
Inguinoscrotal swellings are commonly encountered condition in pediatric surgery. These swellings often necessarily arise due to persistent funicular process or in the constituents of spermatic cord.<sup>[10]</sup> Among all the causes of inguinoscrotal swellings, the most common causes are inguinal hernia and the hydrocele.<sup>[11]</sup> Inguinal hernia in the childhood may not be the sole presentation, there are certain associated conditions which may be observed with inguinal hernias. These associated anomalies include hypospadias, epispadias, cryptorchidism, ambiguous genitalia, prune belly syndrome, and bladder exstrophy. The incidence of such conditions is higher in preterm neonates, that is, about 30% preterm neonates may have these

**Table 2: Distribution according to the characteristics of clinical features**

Characteristics of Clinical features	Frequency (n=53)	Percentage
Clinical features		
Swelling	53	100
Pain	1	1.9
Site of swelling		
Inguinal	17	32.1
Inguinoscrotal	31	58.5
Scrotal	5	9.4
Duration of swelling		
<1 month	3	5.6
1 month–1 year	28	52.8
>1 year	22	41.5

**Table 3: Gender-wise association of diagnosis with laterality**

Gender	Diagnosis	Side			P-value
		Right	Left	Bilateral	
Male	Inguinal hernia	20 (57.1)	13 (37.1)	2 (5.7)	0.9
	Hydrocele	7 (63.6)	4 (36.4)	0 (0)	
	Undescended testis	1 (33.3)	2 (66.7)	0 (0)	
Female	Inguinal hernia	2 (50)	2 (50)	0 (0)	NA
	Total				
Total	Inguinal hernia	22 (56.4)	15 (38.4)	2 (5.1)	0.61
	Hydrocele	7 (63.6)	4 (36.4)	0 (0)	
	Undescended testis	1 (33.3)	2 (66.7)	0 (0)	

**Figure 1: Distribution according to the ultrasonography diagnosis**

conditions along with inguinal hernias.<sup>[12,13]</sup> We aimed to study different types of inguinoscrotal swelling in children using clinical assessment and radiological evaluation.

The previous studies have reported that maximum cases of inguinoscrotal swelling especially inguinal hernias present in children below 5 years of age.<sup>[14]</sup> In our study, the majority of children (62.3%) belonged to 1–5 years of age group. Similarly, in a study of Wani *et al.*, maximum children with

inguinoscrotal swelling belonged to 3–6 years of age at the time of presentation (30%).<sup>[15]</sup> Approximately 50% cases with inguinoscrotal swellings in a study by Verma *et al.* belonged to toddler and preschool age group.<sup>[8]</sup> The age of presentation was similar in a study of Charles *et al.*, where it was reported that >70% cases with inguinal hernia present before 6 years of age.<sup>[6]</sup>

Male predominance for inguinoscrotal swelling has been reported by the previous literature.<sup>[17,18]</sup> In the present study, about 92.5% cases with inguinal swellings were males. Thus male predominance was observed with male: female ratio of 12.3:1 in our study. Jadhav *et al.* documented male predominance for inguinoscrotal swellings with male: female ratio of 11.5:1.<sup>[19]</sup> Verma *et al.* documented male predominance of inguinal swelling with a ratio of 7:1.<sup>[8]</sup>

Preterm delivery and prematurity are identified as a significant risk factor associated with inguinal hernias and congenital hydrocele.<sup>[20]</sup> Rao *et al.* reported the incidence of inguinal hernia in premature infants as 13%.<sup>[20]</sup> In our study, about 30.2% cases with inguinoscrotal swellings were born preterm. However, in studies conducted by Honeyपालsingh *et al.*<sup>[2]</sup> and Jadhav *et al.*,<sup>[19]</sup> prematurity was associated with inguinoscrotal swellings in 2 (10%) cases.

We conducted the study in 53 cases with inguinoscrotal swellings. About 35.1% cases had inguinal swellings whereas 8.8% had scrotal swellings. Apart from swelling, pain was associated with 1.9%, that is, one child experienced pain. The pain may also represent complications such as loop entrapment and torsion of testes.<sup>[8]</sup> Verma *et al.* (2018) noted inguinal swellings in 77.3% cases whereas 13.6% and 9.1% cases had scrotal and inguinoscrotal swellings, respectively.<sup>[8]</sup> Jadhav *et al.* documented incarceration in 4% cases and that too on the right side presenting with severe pain.<sup>[19]</sup> The duration of swelling may help in determining the complication in cases with inguinoscrotal swellings and also depicts the health seeking behavior of parents or guardians of the children. In our study, as per the history, the duration of swelling was found to be between 1 month and 1 year (52.8%) in maximum cases, followed by 41.5% cases in whom swelling was present for more than 1 year. Similarly, Jadhav *et al.* observed swelling with duration of 1 month–1 year in maximum number of cases (46%) followed by swelling for 1–5 years (40%).<sup>[19]</sup>

Our study aimed at evaluating inguinoscrotal swellings clinically as well as radiologically. USG was done for fulfilling this objective. USG has been considered as a safe and inexpensive tool which can be utilized in children and infants without the risk of radiation hazard. This tool might help in improving the diagnosis in case of inguinoscrotal

swelling and in deciding the management strategy in case of inguinoscrotal swelling.<sup>[9]</sup> Based on the findings of clinical examination and radiological diagnosis, final diagnosis was established. USG was suggestive of inguinal hernia in maximum cases 73.5% and hydrocele in 20.8% cases. USG revealed undescended testes in 5.6% cases which was in concordance with the clinical diagnosis. Our study findings were supported by findings of Meena *et al.*, in which the authors recommended the use of USG in all cases of inguinoscrotal swellings irrespective of the mode of presentation of the child.<sup>[21]</sup> Youssef *et al.* highlighted the role of color Doppler USG for guiding in diagnosis as well as management of inguinoscrotal/inguinolabial swelling. The USG revealed hydrocele in majority of cases (35) and among them, hydrocele was of non-communicating type in maximum cases. Hydrocele was followed by hernia and undescended testes in 30 cases each.<sup>[9]</sup>

The literature suggests inguinal hernia and hydrocele as a most common causes of inguinoscrotal swelling in children.<sup>[2]</sup> In our study, inguinal hernia was the most common cause of inguinoscrotal swelling in 73.5% cases followed by hydrocele (20.8%) cases. Our study findings were concordant with the findings of Verma *et al.* in which 72.7% of the swellings were due to inguinal hernia followed by hydrocele in 11.4% cases.<sup>[8]</sup> Koranga *et al.* observed inguinal hernia in all the cases with inguinoscrotal swellings and of them 10 (out of 40) cases had associated hydrocele.<sup>[6]</sup> Congenital inguinal hernias may be predominantly observed on the right side as developmentally, the right testes descend late as compared to the left testes. Unilateral hernias are more common in male infants whereas bilateral hernias are more common in female infants.<sup>[6]</sup> However, it has been suggested that hernias may be bilateral in 10–15%.<sup>[8]</sup> Out of various causes, inguinal hernia was observed as bilateral as well as unilateral swellings whereas other swelling was unilateral. Inguinal hernia was bilateral in 5.2% cases in males and none in females. Inguinal hernia was predominantly observed on the right side in males, whereas in females, the laterality showed no difference. Hydrocele was predominantly right-sided whereas undescended testes were commonly observed on the left side. Our study findings were concordant with the findings of the previous studies.<sup>[6,8]</sup>

The limiting factor in our study was the sample size because of a worldwide COVID-19 pandemic. Although a fair sample size could be achieved and had there been no pandemic in the duration of the study, we could have recruited a significant more number of patients. Due to the limited time period of the study, children could not be followed in case they developed hernia on the contralateral side.

## CONCLUSION

Inguinoscrotal swellings are one of the most common congenital anomalies observed in children majority of them being attributed to inguinal hernia and hydrocele. The main cause being patent processus vaginalis which fails to obliterate. Although these swellings are termed as congenital, they may occur at any time during infancy till childhood, mostly before 5 years of age. The majority of inguinal hernias are right-sided due to delay in descent of the right testis; however, B/L inguinal hernias are not uncommon. Although clinical examination itself establishes the diagnosis in various inguinoscrotal swelling, USG is recommended as to rule out contralateral hernia and to prognosticate chances of developing hernia on the other side depending on the size of deep ring. Inguinal hernia does not resolve spontaneously and should be repaired as soon as possible to avoid the risk of incarceration or strangulation. Pain in inguinoscrotal swelling represents complication and needs to be managed promptly for successful clinical outcomes.

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