

## Original Article

## Irreducible Inguinal Hernias in the Paediatric Age Group

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## ABSTRACT

**BACKGROUND:** An inguinal hernia is said to be irreducible when the content fails to return into the peritoneal cavity without surgical intervention. Irreducibility is an ever present risk in untreated inguinal hernias and its management remains an important part of pediatric surgery practice. When a hernia is irreducible, morbidity and mortality increase. This risk of irreducibility is more in some patient groups.

**METHODS:** A retrospective analysis of all irreducible inguinal hernias in children of both sexes from neonatal age to 15 years who presented at the University of Nigeria Teaching Hospital from January 2000 to June 2010 and needed emergency groin exploration when reduction failed on conservative management.

**RESULTS:** There were 25 irreducible inguinal hernias requiring emergency groin exploration. This represents 10.2% of all inguinal hernias managed within the period, with a male:female ratio of 11.5:1. Nineteen (76%) were on the right while six (24%) were on the left. Forty percent (40%) of the irreducible hernias were in older infants. Sixty-seven (67%) of the neonatal hernias presented as irreducible. There were 3 bowel resections (12% bowel resection rate), 2 testicular losses (8% testicular loss rate) and one death (4% mortality).

**CONCLUSION:** There is a high rate of irreducibility of inguinal hernias in neonates, and in right-sided hernias. Identification of risk factors in and risk stratification of patients with uncomplicated inguinal hernias will help reduce the rate of irreducible inguinal hernias and their attendant morbidities.

**KEY WORDS:** Irreducible; Inguinal hernia; Pediatric

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## INTRODUCTION

Childhood inguinal hernias are common congenital anomalies due to persistent and wide patency of the processus vaginalis allowing protrusion of peritoneal content, usually bowel, which may become irreducible by obstruction and consequent strangulation. Management of inguinal hernias still constitute an important component of pediatric surgical workload<sup>1</sup> and irreducible cases constitute a variable percentage. Most irreducible inguinal hernias are on the right side, in males and younger children<sup>2</sup>. Increased morbidity due to complicated inguinal hernias should be reduced by early repair policy especially in the groups more

vulnerable to developing complications<sup>3</sup>. We present the outcome in management of irreducible inguinal hernias over an 11 year period.

## MATERIALS AND METHODS

This is a retrospective study of patients from birth to 15 years who had emergency surgery for irreducible inguinal hernias in University of Nigeria Teaching Hospital Enugu, from January 2000 to June 2010. These were irreducible inguinal hernias which failed to reduce on initial conservative management and hence required emergency surgery. The information were obtained from pediatric surgery records and included age, sex, side of hernia, findings at surgery, surgery done, complications. Data on children who had elective or urgent hernia repairs within same period were also collected for comparison. The data was analyzed and expressed as percentages and means as well as represented with tables and charts. Those initially irreducible hernias which later reduced on conservative management and were operated on the next operation list as well as children above 15 years were excluded.

## RESULTS

On the whole 246 patients were operated on for inguinal hernias (tables 1 and 2). Twenty five were irreducible hernias (10.2%) which required emergency inguinal exploration and hernia repair (table 1).

TABLE 1: AGE DISTRIBUTION OF REDUCIBLE INGUINAL HERNIAS

AGE	LEFT INGUINAL HERNIA		RIGHT INGUINAL HERNIA		BILATERAL INGUINAL HERNIA		TOTAL
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	
<1MONTH	-	-	3	-	-	-	3
>1MONTH-12MONTHS	21	-	21	-	13	-	55
>12MONTHS-5YEARS	27	9	57	5	8	2	108
>5YEARS-10YEARS	15	-	22	-	5	1	43
>10YEARS-15YEARS	5	-	4	2	1	-	12
TOTAL	68	9	107	7	27	3	221

Of the irreducible hernias 19 (76%) were on the right, 6 (24%) on the left (figure 2), but no irreducibility was seen in bilateral hernias (table 2). The male: female ratio for reducible hernias is 10.6: 1 while for irreducible hernias is 11.5: 1 (i.e 92% irreducible hernias occurred in males). The proportion of total hernias that are irreducible on right and left sides are 16.7% and 7.8% respectively. Of all the irreducible hernias on the right, 18 (95%) were in males and only 1 (5%) in female, while of the 6 hernias on the left, 5 (83%) were in males and

1(17%) in female (table 2).The age range for the irreducible hernias were 7 days to 9 years with a mean age of 22.3months.Patients in the age range >1month to 12 months had the highest number of irreducible cases (40% of total irreducible hernias), followed by neonatal age group (24%) (figure 4). However when compared with the total number of hernias in each age group, the percentage of irreducible hernias in neonates becomes 67% (Table 3).

TABLE 2:AGE DISTRIBUTION OF IRREDUCIBLE INGUINAL HERNIAS

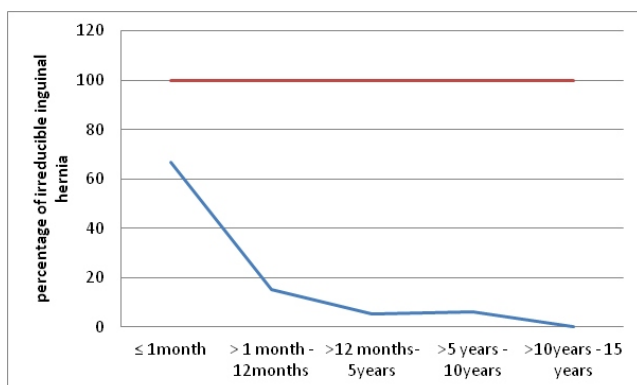
AGE	LEFT INGUINAL HERNIA		RIGHT INGUINAL HERNIA		BILATERAL INGUINAL HERNIA		TOTAL
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	
d1MONTH	1	-	5	-	-	-	6
>1MONTH-12MONTHS	1	1	8	-	-	-	10
>12MONTHS-5YEARS	3	-	3	-	-	-	6
>5YEARS-10YEARS	-	-	2	1	-	-	3
>10YEARS-15YEARS	-	-	-	-	-	-	-
TOTAL	5	1	18	1	-	-	25

TABLE3:PERCENTAGE OF TOTAL HERNIAS IN EACH AGE GROUP THAT WAS REDUCIBLE/IRREDUCIBLE

AGE RANGE	PERCENTAGE OF IRREDUCIBLE	PERCENTAGE OF REDUCIBLE	TOTAL
d1MONTH	67%	33%	100%
>1MONTH-12MONTHS	15%	85%	100%
>12MONTHS-5YEARS	5%	95%	100%
>5YEARS-10YEARS	6%	94%	100%
>10YEARS-15YEARS	0%	100%	100%

Proportion of irreducible hernias increased with decreasing age as it was 67% in neonates, 15% in older infants, 5% from end of infancy till 5years, 6% between 5 and 10 years and no irreducibility between 10 and 15 years (table 3,fig 1).

Figure 1 : Graph showing decline in proportion of irreducible hernias as the age increases



The proportions of males(11.6%) and females(11.1%) with irreducible hernia compared with the total number

of hernias in each sex were similar .There was only one death which occurred intra-operatively in one male neonate (4% mortality).

Figure2: Bar chart comparing the percentage of irreducible and reducible inguinal hernias in each age group

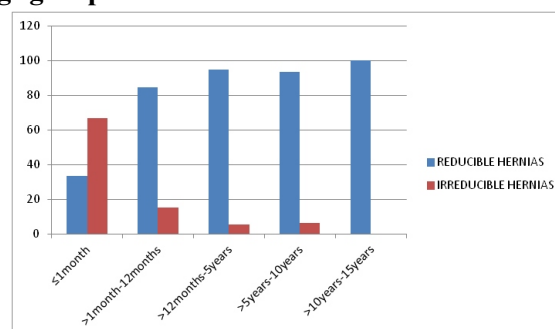


FIGURE 3:SEX DISTRIBUTION OF IRREDUCIBLE INGUINAL HERNIAS

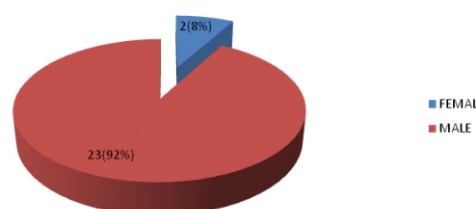
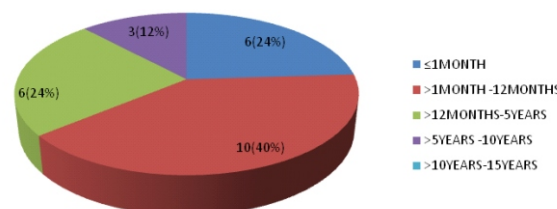


FIGURE 4:PROPORTION OF IRREDUCIBLE HERNIAS IN DIFFERENT AGE GROUPS



Most had inguinal hernia repair with no bowel or gonadal loss . Of the 25 irreducible hernias, there were 2 testicular losses (8%), both occurring in right hernias in infants; one gangrenous ovary/tube was found (4%) in a left hernia in an infant ; and 3 bowel resections (12%) in male infants. The results are tabulated and charted below.

## DISCUSSION

Elective surgical treatment of inguinal hernias in pediatric age group should be the desired standard of care<sup>3</sup>. Surgical care of inguinal hernias still constitute a large proportion of pediatric surgical services in different parts of the world<sup>1</sup>. The percentage of all

inguinal hernias which are irreducible varies in different series reviewed<sup>3,4,5,6,7,8</sup>. The irreducible hernias constitute 10.2% of all inguinal hernia surgeries in this study. This is comparable to 9% by Primatesta<sup>4</sup> and 9.8% by Eze<sup>5</sup>, but lower than 16% and 20.6% by Davies<sup>6</sup> and Mbah<sup>7</sup> respectively and higher than 4.8% and 5.1% by Ameh<sup>3</sup> and Nilsson<sup>8</sup> respectively. It seems the percentage of irreducible hernias in the neonatal age group is much higher than in older paediatric age groups as it is 66.7% in our study and comparable high rate of 80% is also recorded in some other studies from Northern Nigeria<sup>9</sup> but a lower incarceration rate of 24% was recorded in infants less than six weeks in a developed country<sup>10</sup>. This disparity in rates of irreducibility between developed and developing countries may be due to earlier detection and prompt treatment of uncomplicated neonatal inguinal hernias in the former<sup>9,10</sup>. The rapid decline in incidence of irreducible inguinal hernias after the neonatal age is well pictured in fig 1 and corroborated by other publications<sup>3,11</sup>. The high rate of irreducibility in neonates with the attendant high risk neonatal emergency anesthesia and surgery makes it imperative that even when the waiting list is long neonates should be operated on preferentially as elective cases. According to a study in Zaria, Nigeria<sup>9</sup> there were no incarcerated/strangulated inguinal hernias after 2 years of age but our study showed a 6% rate of irreducible hernias in the age range >5 years to 10 years. Other publications have also recorded irreducible hernias beyond 2 years of age<sup>11</sup>. In all, 92% irreducible hernias occurred in males which is very similar to 91% by Primatesta<sup>4</sup>. This reflects the much higher number of males with inguinal hernias as there is no difference in the proportion of irreducible hernias in males and females in this study: 11.6% and 11.1% respectively. This finding is also corroborated by other studies<sup>12</sup>. Seventy-six percent (76%) of all irreducible hernias were on the right side (14.2% of all unilateral right hernias) while 24% were on the left (7.2% of all unilateral left hernias). From the foregoing we agree with Rai et al<sup>2</sup> that identification of risk factors and risk stratification is important in managing elective hernia cases to avoid complications and hence neonates, males and right-sided hernias should be given preference.

We recorded a 12% bowel resection rate which is similar to 11% published by Ameh<sup>3</sup>, but is much lower than 57% obtained by Eze<sup>5</sup> in adults. Furthermore all bowel resections were in males. Testicular loss rate of 8% is comparable to 11% by Ameh<sup>3</sup> but much higher than 0% seen by Nmadu<sup>14</sup> and less than Onuora<sup>15</sup> who had 20% testicular loss rate. There was also one ovarian loss.

There were no cases of irreducibility involving patients with bilateral inguinal hernias. Does bilateral hernia protect against episodes of irreducibility? This is an observation which may not be explained immediately

but needs further studies to elucidate.

Some authorities now question the appropriateness of routine elective repair of inguinal hernia in all patients. Van den Heuvel's extensive review in adult hernias suggested that in those less than 50 years and onset of inguinal hernia more than 3 months at presentation, watchful waiting is a valid management option<sup>16</sup>. This may not be applicable to children especially neonates where rates of irreducibility are as high as 80%<sup>9</sup>. Also in developing countries where there are poor pediatric surgical emergency services intervening only when complications have set in will lead to increased mortality and morbidity<sup>3,9</sup>.

This present study has limitations as it is a single institution retrospective study and did not study all risk factors that predispose to complications in pediatric inguinal hernias.

We recommend that a multi-institutional, prospective study involving the assessment of more risk factors for irreducibility in our environment will assist in risk stratification of patients.

**Conclusion:** Irreducibility is significantly higher in right-sided inguinal hernias and inguinal hernias in neonates, though it can occur in any inguinal hernia. Management of irreducible inguinal hernias remains a significant part of pediatric surgery practice. Identification of risk factors in and risk stratification of patients with uncomplicated inguinal hernias will help reduce the rate of irreducible inguinal hernias and their attendant morbidities.

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