

Original article

Management of congenital inguinal hernia at A.V.B.R.H

Dr. Harmandeep Singh¹, Dr.D.D. Wagh²

Department of Surgery , Jawaharlal Nehru Medical College and Acharya Vinobha Bhave Rural Hospital Sawangi (Meghe), Wardha.

Datta Meghe Institute of Medical Sciences (DU)

Corresponding author: Dr. Harmandeep Singh

ABSTRACT

Introduction - A prospective observational study of 54 children presenting with Congenital Inguinal Hernia (CIH) was conducted over a period of 2 years at rural tertiary care center to study the clinical presentation and the difficulties encountered by the surgeon in management of CIH.

Material and Methods - After detailed history taking and examination all children with a complaint of an inguinal swelling underwent Ultrasonography to assess bilateral inguinal region. Herniotomy remaining the standard treatment for CIH, two different techniques were practiced depending upon the age of the child. Children with an evidence of Bilateral CIH or Patent Processus Vaginalis (PPV) were subjected to Bilateral Herniotomy.

Observation & Results - The inguinal hernia in the study group was common in the 6-10 years age group. 85% of the study group was males; a swelling in the inguinal region was the commonest symptom. In the study group, 55.6% were right-sided hernia, 11.1% were bilateral hernia. 6 cases with no evidence of hernia were seen on clinical examination. The swelling of the inguinal hernia was irreducible in one case. 51% of the study group was term deliveries. The sensitivity and the specificity of ultrasonography in detecting a potential CIH or PPV in the contralateral side was 100% and 97.92% respectively. The positive and negative predictive values of this diagnostic tool were 85.71% and 100% respectively. 53 out of 54 cases underwent elective surgery. No complications were seen post-operatively. Follow-up period of all patients was uneventful.

Conclusion- This study was an effort to overcome difficulties encountered by the surgeon in the absence of a clinically demonstrable inguinal hernia in children with a history of an inguinal swelling by the use of ultrasonography and also to find the clinical characteristics of the children with inguinal hernias. The indication for contralateral exploration was addressed by the use of ultrasonography.

Keywords - Congenital Inguinal Hernia, PPV, Ultrasonography, Management

INTRODUCTION

Inguinal and scrotal swellings in children are frequently encountered in the surgical practice. Most of these swellings are congenital and they have an asymptomatic presentation. They are related to the descent of the testes and the processus vaginalis¹. To date, the mechanism of the testicular descent is speculative, with various hypotheses being put forth, the most recent one being that of "WATER-TRAP" which was made by Heyns and Deklerk². The abnormalities in the descent result in ectopic or undescended testes. The undescended testis, which is found in more than 90% of the cases, is associated with congenital inguinal hernias³.

Inguinal and scrotal swellings in children form a majority of the surgical conditions which require treatment. Inguinal hernia repair is the most frequently performed operation in the paediatric age group. Studies from various centres have

reported an incidence of 3.5 to 5.0% for the inguinal hernias in full term infants and an incidence of 44 to 55% in premature and LBW babies^{3,5}. The studies of Rowe et al.,⁷ and Grosfeld³ et al., reported an incidence of 55%-60% of the inguinal hernias on the right side, that of 25% on the left side and that of 15% bilaterally. Most often the herniae are asymptomatic, which are detected during the first few years of life and at birth in premature babies.

Routine hernia repairs are performed on a day care basis. In this study, most of the patients will be treated as in-patients, with the average duration of the hospitalization being between 1-6 days. The reasons for this being the unavailability of adequate healthcare professionals and pediatric care facilities after discharge as most of our patients are from remote village areas.

A controversy exists for routine contra-lateral exploration in the absence of a clinical inguinal hernia. Various modalities have been described for detecting contra-lateral hernias, but their efficacy and necessity are debatable.

In the study series of Hashish and Mashaly et al., over a period of 18 months, 173 children presented with a clinically apparent unilateral Congenital Inguinal Hernia and were investigated for contralateral inguinal hernia. Positive ultrasonographic findings were found in 31 of the 173 patients (17.9%). Twenty-seven of the 31 patients (87.1%) proved to have a PPV or a definite hernial sac, while 4 (12.9% false positive) showed no hernial sac on exploration. Two of the 142 patients who had negative ultrasonographic findings at the contralateral side, developed an inguinal hernia after 4 and 6 months respectively (1.4% false negative). The sensitivity and the specificity of ultrasonography in detecting a potential CIH or PPV in the contralateral side was 87.1% and 98.6% respectively. The positive and negative predictive values of this diagnostic tool were 93.1% and 97.2% respectively, and the accuracy rate reached 96.5%⁹.

Holder and Rescorla et al., recommended a routine exploration of the opposite site. The recent consensus is on a contra-lateral exploration, only when it is indicated.^{10,11}

The recent trend is to manage inguinal hernia by herniotomy on a day care basis. Although a laparoscopic hernia repair is conducted in adults, there is little or no indication to use this technique in infants and children. But there are fewer studies, which have been done on inguinal hernia in children in our country and in the world. This study is being conducted with the aim to study the clinical presentation and management of inguinal hernia in children.

AIM & OBJECTIVES

Aim: To study the clinical presentation and management of inguinal hernia in children

Objectives:

- I. To study the difficulty in making diagnosis on clinical examination and overcoming it.
- II. To study the role of radiological modalities for confirmation of diagnosis.
- III. To evaluate the different surgical technique depending upon the age of the child.

- IV. To define the indication for the contralateral exploration.

MATERIALS & METHOD

The present study was carried in the Department of General Surgery of J.N. Medical College, Sawangi (Meghe), Wardha, Maharashtra from April 2014 to August 2016.

Study Design: This study is a Prospective-Observational.

Study Population: The study comprises of 54 cases of Congenital Inguinal Hernia, which underwent Herniotomy.

Inclusion criteria:

- All patients with Congenital Inguinal Hernia, including patients with Obstructed, Strangulated or Incarcerated hernia & Undescended testis coming to A.V.B.R.H., SawangiMeghe, Wardha.

Exclusion criteria:

- Patients with Hydrocele
- Children with Birth Weight less than 2000gms were excluded from the study.

Method:

Evaluation & Diagnosis

Written consent was obtained from all patients before the enrolling in the study. Identity of the patients was kept confidential. Baseline information such as demographics (age and weight/height) was recorded. After obtaining the history, the children were examined systematically, which included an examination of the inguinal and the groin regions and the scrotum and its contents. The site, size, variability of the size, reducibility or any underlying straining for micturition and the presence or absence of the testis in the scrotal sac were noted. The respiratory system, the cardiovascular system and the abdomen were examined for any associated congenital anomalies. Patients underwent laboratory investigations (Complete blood cell count, liver function tests, kidney function tests, electrolytes), and urine routine analysis. Additional necessary investigations were done when indicated either clinically or from blood tests. Diagnosis was confirmed with Ultrasonography at Department of Radiology, A.V.B.R.H. using HITACHI ALOKA PROSOUND ALPHA 7, with a 7MHz-12MHz linear transducer.

Management

- Age Less than 1 year –Mitchell Banks Operation was

done, where herniotomy was done without opening the external oblique aponeurosis.

- Age More than 1 year – Ferguson’s Technique was used, where herniotomy was done after opening the external oblique aponeurosis.

After completion of baseline investigations, patient were planned for Herniotomy of the affected side. Bilateral Herniotomy was planned for patients who showed presence of bilateral Patent ProcessusVaginalis on Ultrasonography.

After the pre-operative assessment & PAC fitness, the affected part was prepared for surgery. The type of surgery was decided, depending upon the age of the child. If the children were of less than one year of age, the Mitchell Banks operation was performed, where herniotomy was done without opening the external oblique aponeurosis. If the children were of more than one year of age, the Ferguson’s technique was performed, where herniotomy was done after opening the external oblique aponeurosis. Choice of incision was horizontal skin crease incision just above the pubic tubercle. After dissection was complete, herniotomy was done with

absorbable Vicryl 3-0 thread on a round body needle. External oblique, if opened, was closed using simple interrupted absorbable suture. Skin closure was done with simple interrupted non-absorbable nylon/silk suture.

After the surgery, the children were nursed in the post-operative wards with antibiotics and adequate analgesia.

The post-operative complications were treated and the children were discharged when they were fit. All the patients were asked to attend the Surgical Outpatients Department for follow-up as and when it was required, 1 month from discharge and every 3 months following that.

The relevant data of the 54 cases was recorded in a pre-designed proforma and tabulated by using suitable statistical methods.

Statistical analysis was done by using descriptive and inferential statistics using z-test for single proportion and chi-square test and software used in the analysis were SPSS 17.0 version, EPI-INFO and GraphPad Prism 6.0 version and $z > 1.96$ is considered as significant and $p < 0.05$ is considered as level of significance.

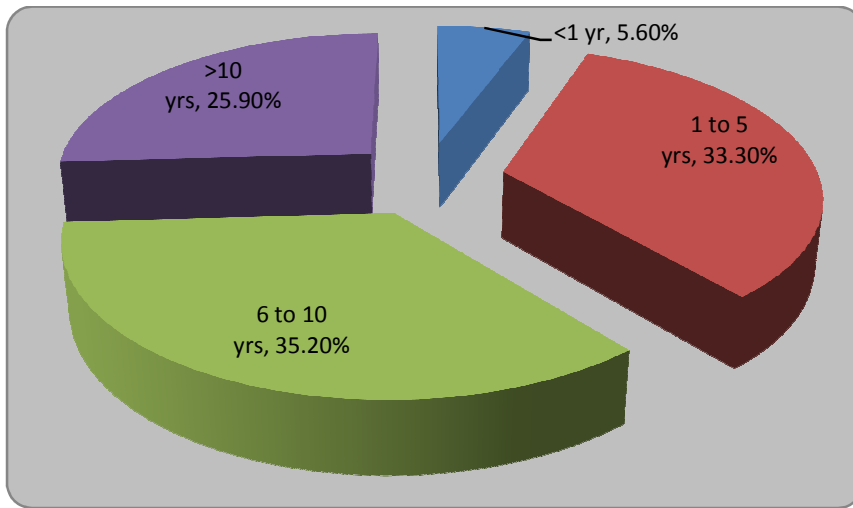
OBSERVATIONS & RESULT

During the study period of 2 years, a total of 54 children underwent Herniotomy. Most of the children belonged to the 6-10 years age group with Mean \pm SD 7.27 ± 4.47 (6 months-17 years), however, the age at the appearance of swelling was 1-5 years in most cases and 22.2% cases complained of a swelling since birth. They were operated in view of the risk of incarcerations.

Table-1: Age-wise Distribution of the study group

Age group (years)	No of patients	Percentage (%)
<1	3	5.6
1-5	18	33.3
6-10	19	35.2
>10	14	25.9
Total	54	100
Mean \pm SD	7.27 ± 4.47 (6 mths-17 years)	

Graph -1: Age-wise Distribution of the study group



About 85% of them were males and only 15% of them were females.

A swelling in the inguinal region was the commonest symptom, which was presented by the patient attenders. 48 cases (89%) presented with unilateral swelling. 6 cases (11%) did not have any swelling on clinical examination. Only one patient had swelling with pain, fever and inability in reducing the swelling, who underwent emergency surgery. The swelling in the inguinal region was present for 1 to 2 years in 90% of the cases.

Among the study sample, the symptoms were studied and it

was found that a majority of the cases (89%) presented with swelling. Other than the swelling, majority of the patient were asymptomatic (72.2%, Z-value-11.84,S) Other associated abnormalities including Undescended Testis &Phimosis were present in 5 cases (9.3%, Z-value-2.34,S). Significant history of Cough, Dysuria was present in 4 cases each (7.4%, Z-value-2.07,S). None of the patients had undergone any previous surgery.

Table-2: Relevant History & Findings

Relevant History/Findings Other than Swelling	No. of Patients	Percentage	z-value
H/O Constipation	2	3.7	1.44,NS
H/O Cough	4	7.4	2.07,S
H/O Dysuria	4	7.4	2.07,S
H/O Previous surgery	0	0	-

Associated Abnormality (Undescended Testis, Phimosis)	5	9.3	2.34,S
No other Findings	39	72.2	11.84,S
Total	54	100	

28 cases in the study group were term deliveries and 26 cases were preterm deliveries.

Majority of the children (80%) had a normal Weight for Height.

On clinical examination, hernia was predominantly right sided (57.4%). In our study, there was no clinically evident bilateral hernia. 6 out of 54 cases (11.1%) had no evidence of hernia on examination.



a) b)

Figure: 1a-b: a) Unilateral Hernia presenting as an inguino-scrotal swelling. b) Shows no apparent swelling in inguino-scrotal region in a child with positive history given by the parents.

On Ultrasonographic evaluation, predominant hernia was right sided (55.5%). USG also detected Bilateral hernia in 7 cases (13%).

On correlating Clinical with USG findings, 6 cases (11.1%) with no evidence of hernia clinically were detected on Ultrasonography and 7 cases (12.96%) of clinically undetected bilateral hernias were evident ultrasonographically. The surgical technique used was mainly Ferguson's technique. Only 3 children under the age of 1 year underwent Mitchell

Bank's operation. Both techniques showed no major post-operative complications.

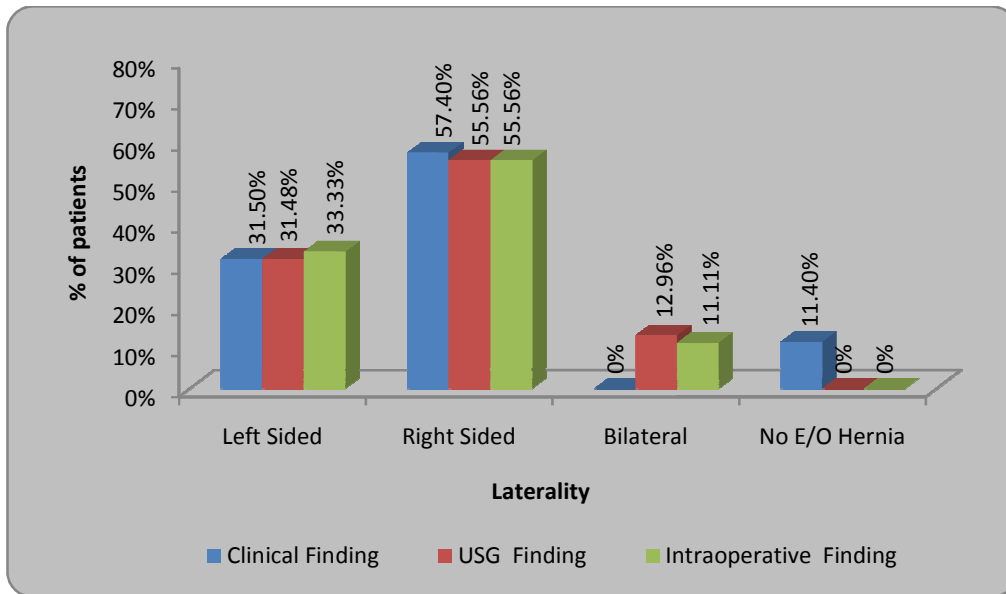
Only 1 patient presented with irreducible hernia and was operated on Emergency basis.

In this study, 30 cases (55.6%) were right sided, 18 cases (33.3%) were left sided and 6 cases (11.1%) were bilateral congenital inguinal hernias.

Table-3: Correlation of Clinical Findings, USG Findings & Intra-Operative Findings

Laterality	Clinical Finding	USG Finding	Intraoperative Finding	p2-value
Left Sided	17(31.5%)	17(31.48%)	18(33.33%)	18.68, p=0.0047,S
Right Sided	31(57.4%)	30(55.56%)	30(55.56%)	
Bilateral	0(0%)	7(12.96%)	6(11.11%)	
No E/O Hernia	6(11.4%)	0(0%)	0(0%)	
Total	54(100%)	54(100%)	54(100%)	

Graph -2: Correlation of USG Findings, clinical findings & Intra-Operative Findings



There was no incidence of any post-operative complication in the form of Surgical Site Infection or Recurrence.

Majority of patients (75.9%) were discharged within 7 days of admission to the hospital, earliest being 5 days and longest stay being 24 days in 1 patient who required pre-operative management of Lower respiratory tract infection (LRTI) in the pediatric ward. Mean Length of hospital stay \pm SD being

7.29 \pm 3.44(5-24) days . None of the patients had any complaints on follow up. Majority of the patients (35.2%) have followed up on OPD basis for more than 1 year.

DISCUSSION

Inguinal and scrotal swellings in children form a majority of the surgical conditions that require treatment. Inguinal hernia repair is the most frequently performed operation in the

pediatric age group. Studies from various centers have reported an incidence of 3.5 to 5.0% for the inguinal hernias in full term infants and an incidence of 44 to 55% in premature and low birth-weight babies^{3,5}. In our study, a 48 % incidence was seen in premature babies. The studies of Rowe et al.,⁷ and Grosfeld³ et al., reported an incidence of 55%-60% of the inguinal hernias on the right side, that of 25% on the left side and that of 15% bilaterally.

Snyder CL reviewed cases at his hospital over the past 4 years; there were 15,321 general surgical operations. Within this group, there were 1991 (13%) inguinal hernia repairs. Fifteen percent were performed in infants younger than 6 months of age, 54% of patients were between 6 months and 5 years of age, and 31% were 5 years of age or older. In another series of 6361 pediatric herniorrhaphies performed by a single surgeon, the male-to-female ratio was 5:1. Right-sided hernias were twice as common as those on the left. The mean age in this series was 3.3 years.¹²

In this study, among the 54 cases, congenital inguinal hernias accounted for 55.6% of the hernias on the right side and for 33.3% on the left side and for 11.1% that occurred bilaterally. Most often the herniae are asymptomatic, which are detected during the first few years of life and at birth in premature babies. In this study, the commonest age of presentation to the hospital was between 6-10 years (35.2%) with most herniae appearing first between the age group of 1-5 years (38.9%), the youngest baby being 6 months old and the Mean Age \pm SD being 7.27 \pm 4.47 years.

In the study series of Grosfeld^{3,4} et al., the male to female ratio was 9:1. The incidence was close to the ratio of 5:1 in the present study, with 85.2% males to 14.8% females. As mentioned in the literature, Co-morbidities such as chronic lung disease associated with prematurity may play a substantial role in the development of an inguinal hernia in this population¹².

To selectively study the burden of congenital inguinal hernia at A.V.B.R.H. we excluded children with a birth weight of less than 2000gms, due to high incidence of inguinal hernia and other congenital anomalies in low birth weight premature babies. In our study, 2 patients had undescended testis along with congenital inguinal hernia. Children with congenital

hydrocele were also excluded from the study as this condition is a different entity than congenital inguinal hernia and warrants a different surgical approach¹². Routine hernia repairs are performed on a day care basis. In this study, most of the patients were treated as in-patients, with the Mean duration of the hospitalization \pm SD being 7.29 \pm 3.44 days. The reasons for this being the necessity of performing the investigations as in patients and the unavailability of adequate anesthetic and neonatal facilities in the postoperative period (most of our patients were from remote village areas). The diagnosis of inguinal hernia by clinical signs such as inguinal bulging, and thickening of the spermatic cord is usually easy, but is not always possible especially in obese children. Likewise, many parents complain of observing a transient inguinal swelling in their child that could not be detected at the time of examination. A controversy exists for routine contra-lateral exploration in the absence of a clinical inguinal hernia. Various modalities have been described for detecting contra-lateral hernias, but their efficacy and necessity are debatable. Holder and Rescorla et al., recommended a routine exploration of the opposite site.^{10,11}

According to systematic review of studies by Ron O et al, the incidence of developing a metachronous contralateral inguinal hernia (MCIH) following open repair of a unilateral inguinal hernia in children was 7.2 % and was not sex or age specific. Children with left-sided inguinal hernia had a significantly higher risk of developing a MCIH than those with a right-sided hernia (10.2 versus 6.3 per cent respectively). Most MCIHs occur in the first 5 years after unilateral inguinal hernia repair. The study concluded routine contralateral groin exploration is not indicated in any situation¹³.

In order to minimize the incidence of negative exploration of the contralateral side, many methods had been used such as herniography¹⁴⁻¹⁶ diagnostic pneumoperitonium,^{17,18} intra-operative laparoscopy¹⁹⁻²¹, and recently ultrasonography.²²⁻²⁶

The evaluation of the inguinal canal by ultrasonography was introduced in 1993.²² Chen et al²³ showed that ultrasonography is more accurate than clinical assessment in diagnosing inguinal hernia in 244 children (97.9 versus 84%). When 4 mm width of the inguinal canal at the level of the internal ring as an upper limit for normal diameter of the inguinal hernia by

ultrasonography was used in diagnosis of clinically undetected hernia, an accuracy rate of 95% was achieved. Likewise Uno et al reported an accuracy rate of 96.6%²⁴. In this series, there was 97.8% accuracy rate. False positive result was present in 12.9%, whereas false negative result was found in 1.4%. False negative result ranges between 1.5-2 % in other series.^{25,26} Toki et al²⁵ showed that the incidence of negative exploration before and after application of ultrasonography in diagnosis of contralateral hernia was 10.2% and 1.5% respectively and this difference was statistically significant.

In the study series of Hashish and Mashaly et al., over a period of 18 months, 173 children presented with a clinically apparent unilateral Congenital Inguinal Hernia and were investigated for contralateral inguinal hernia. Positive ultrasonographic findings were found in 31 of the 173 patients (17.9%). Twenty-seven of the 31 patients (87.1%) proved to have a PPV or a definite hernial sac, while 4 (12.9% false positive) showed no hernial sac on exploration. Two of the 142 patients who had negative ultrasonographic findings at the contralateral side, developed an inguinal hernia after 4 and 6 months respectively (1.4% false negative). The sensitivity and the specificity of ultrasonography in detecting a potential CIH or PPV in the contralateral side was 87.1% and 98.6%

respectively. The positive and negative predictive values of this diagnostic tool were 93.1% and 97.2% respectively, and the accuracy rate reached 96.5%⁹.

In this study we evaluated the role of Ultrasonography in cases where the parent described the swelling in the inguinal region but the surgeon was unable to confirm its presence. On comparing clinical findings with ultrasonographic findings, out of 54 cases, 6 cases (11.1%) with no evidence of hernia clinically were detected on Ultrasonography and 7 cases (12.96%) of clinically undetected bilateral hernias were evident ultrasonographically with a significant χ^2 -value of 13.02, $p=0.0046$, S.

In this study, we subjected all patients to pre-operative ultrasonography. Bilateral exploration was planned in 7 cases out of 54, where there was ultrasonographic evidence of bilateral patent processus vaginalis. 6 out of 7 cases (85.7%) proved to have a contralateral hernia sac intra-operatively while 1 case (14.3%) showed no hernia sac on exploration. The sensitivity and the specificity of ultrasonography in detecting a potential CIH or PPV in the contralateral side was 100% and 97.92% respectively. The positive and negative predictive values of this diagnostic tool were 85.71% and 100% respectively.

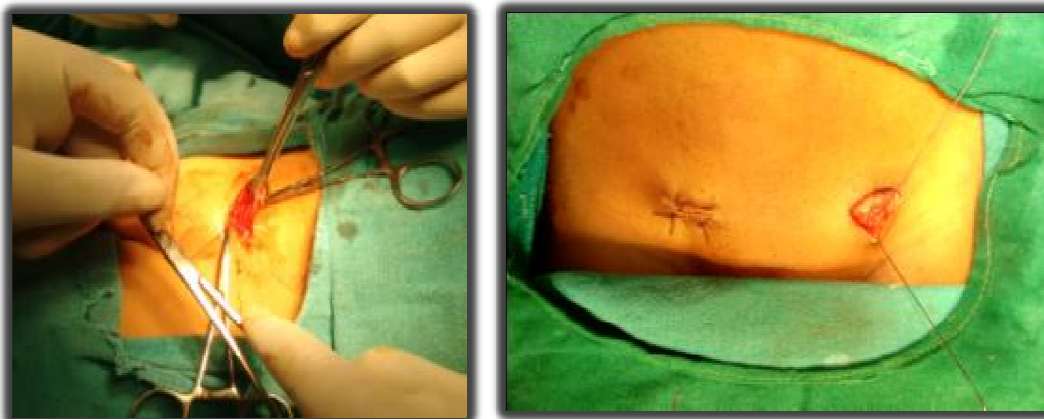


Figure-2: Herniotomy and closure in Bilateral hernia.

Almost all the hernia patients who underwent herniotomy had small amounts of fluid in the hernial sacs.

Undescended testis is an anomaly that is commonly associated with congenital inguinal hernias. Scorer and Farrington found that 30.3% of the premature infants had undescended testes, whereas there was only a 3.4% incidence in full term babies and by one year of age, the incidence was approximately 0.8%²⁷. According to Witherington et al., a patent processusvaginalis with an undescended testis is an undisputed indication for orchidopexy²⁸. In this study, two cases of undescended testes presented with associated inguinal hernias. Both cases were treated with orchidopexy.

According to Mlay and Sayi²⁹ & Ravikumar V. et al³⁰, the commonest site for the undescended testis is the superficial inguinal pouch. In our study, both cases of undescended testis showed the testis at the superficial inguinal pouch

Nilsson H et al reported the incidence of inguinal hernia surgery performed in emergency to be 5.1% as compared to 36.5% in cases of femoral hernia³¹. Rowe and Lloyd reported incarcerations of the congenital inguinal hernias in 17% of the right sided hernias and in 7% of the left sided hernias, the overall rate being 12%.⁷ In this study, 1 case of incarcerations was present in right sided congenital hernias (1.8%) in a 14 year old child; he was treated by an emergency exploration and repair, since the attempts at a reduction had failed. Rowe et al.,⁷ recommends elective surgery after a reduction, since it has a lower rate of complications as compared to an emergency surgery (1.7% vs. 22.1%). But in our study no operative or post-operative complication was noticed following emergency exploration in 1 case.

The recurrence in the childhood inguinal herniae is less than one percent. In the study of Wright et al.⁶, recurrences were encountered in over 1,600 inguinal hernia operations. The studies of Grosfeld³ demonstrated a higher incidence of hernias in older children. The recurrences ranged from 3 weeks to 4 years in Wright's study. 80% of the recurrences in children are noted within the first post-operative year⁶. In our

series, there were no cases of recurrent herniae within the follow-up period.

CONCLUSION

Inguinal hernia is a common congenital condition in children presenting at A.V.B.R.H., Sawangi(M). The general surgeons often face difficulties in identifying and confirming the presence of the inguinal hernias.

Most of the inguinal hernias in this study were congenital and they included the children who were between 6-10 years, especially male children. A unilateral swelling in the right inguinal region was the most common symptom. Most of the swellings were reducible, the testes were palpable, and a cough impulse was seen in a majority of the children. Both surgical techniques were adequate in the treatment of hernia according to the age group.

This study was an effort to overcome such difficulties by the use of ultrasonography and also to find the clinical characteristics of the children with inguinal hernias. The indication for contralateral exploration was addressed by the use of ultrasonography. We recommend the use of Ultrasonography pre-operatively in all patients presenting with a complaint of inguino-scrotal swelling to the Surgical OPD as the difficulty in diagnosis of clinically non-demonstrable hernia and contralateral inguinal hernia can be overcome by the same. Patients with evidence of bilateral patent processusvaginalis on ultrasonography should be treated with bilateral Herniotomy.

Surgical techniques recommended in the literature for children less than 1 year & above the age of 1-year are Mitchell Bank's operation & Ferguson's Technique respectively and successfully remain the techniques of choice without morbidity and recurrence.

As most of the patients are from remote rural areas without adequate facilities for post-operative care, average hospital stay was 7 days from admission to discharge without any significant morbidity or any post-operative complication. The follow-ups of the patients were uneventful.

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