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Research Article

**DIAGNOSTIC ACCURATENESS OF MAGNETIC  
RESONANCE IMAGING FOR RESTRAINING TESTES IN  
CRYPTORCHIDISM CASES**

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**Abstract:**

**Aim:** To determine the diagnostic accuracy of MRI for localizing undescended testes in clinically detected cases of cryptorchidism taking surgical findings as gold standard.

**Study design:** A Cross-sectional survey

**Methods:** It was a cross-sectional study held in the department of Diagnostic Radiology, Sir Ganga Ram Hospital, Lahore for one-year duration from April 2019 to April 2020. Patients were recruited by non-probability purposive sampling technique. One hundred and seventy clinically and ultrasonically (superficial linear 7.5 MHZ transducer with AU5 Harmonic EZAOTI) diagnosed cases of non-palpable undescended testes having age ranged between 0-16 years were selected from the Department of Diagnostic Radiology. Children having ambiguous genitalia on clinical examination and Boys not fit for anesthesia or surgery were excluded from study. MRI of all cases using 1.5 Tesla MR System was performed.

**Results:** The age of the patients ranged between 0-16 years. Mean age of the patients was  $5.1 \pm 2.3$  years. According to the side affected, there were 49 cases (28.8%) on right side, 93 cases (54.7%) on left side and 28 cases (16.5%) bilateral. Comparison of the results of MRI with surgical findings showed that there were 127 true positive cases, 3 false positive cases, 27 false negative cases and 13 true negative cases. Statistical analysis of the study revealed sensitivity 82.4%, specificity 81.2%, diagnostic accuracy 82.3%, positive predictive value 97.6%, and negative predictive value 32.5% of MRI for localizing undescended testes in clinically detected cases of cryptorchidism taking surgical findings as gold standard.

**Conclusion:** It is concluded that magnetic resonance imaging (MRI) offered a new promising imaging modality for localization of the undescended testis because it has better resolution, multiplanar capability, different sequences and is also non-hazardous and safe.

**Key words:** MRI imaging, Localizing of testes, Diagnostic accuracy

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**INTRODUCTION:**

The most common problems with undescended testes are testicular tumor, decreased fertility, testicular torsion, and inguinal hernia. Chung and Brock described common referral scenarios for men with a history of cryptorchidism and orchidopexy for infertility counseling and examined the relationship between cryptorchidism and male infertility. Cryptorchidism or an undescended testicle is one of the most common birth defects in the pediatric population. The frequency of cryptorchidism in full-term newborns is 1% and 3%, and in premature babies as much as 30%. Boys with cryptorchidism are at a higher risk of infertility as well as testicular cancer. Boys with undescended testicles are initially diagnosed and referred by primary care physicians who detect cryptorchidism during a routine physical examination. The exact developmental phenomena leading to cryptorchidism are not well understood; nevertheless, abnormalities in functional, anatomical as well as hormonal aspects during embryogenesis and testicular descent are implicated. Undescended testes can be categorized on the basis of physical and operational findings: (1) true undescended testes (including intra-abdominal, spying inner ring and canal nuclei) that exist along the normal descent path and have normally inserted; (2) ectopic nuclei with abnormal nodular attachment; and (3) retreating nuclei that are not truly undescended. The most important category to distinguish in a physical exam is the retraction nucleus, as no hormone or surgical therapy is required for this condition. Cryptorchidism has quite serious clinical implications, such as testicular infertility and malignancy. Undescended testes, which may be undetectable and located high up, usually have associated epididymal anomalies obstructing the sperm conduction pathway. Despite the fact that ultimately, surgical intervention is necessary; describes the roles of diagnostic imaging. Imaging assessment of a patient with an undetectable nucleus has evolved in recent decades. MRI is believed to be more accurate in determining the undescended nucleus. It is a non-invasive method with the added benefit of not being exposed to ionizing radiation. It is now widely accepted that MRI should be performed prior to any invasive procedure. The aim of the study is to evaluate the diagnostic role of MRI in the location of the testicles in cases of clinically undetectable

undescended testes as a prerequisite for early corrective surgery. This will significantly reduce the number of complications.

**METHODOLOGY:**

It was a cross-sectional study held in the department of Diagnostic Radiology, Sir Ganga Ram Hospital, Lahore for one-year duration from April 2019 to April 2020. Patients were matched by purposeful sampling without probability. One hundred and seventy clinically and ultrasonically (7.5 MHz superficial linear transducer with AU5 Harmonic EZAOTI) were diagnosed with cases of undetectable undescended testes from 0-16 years of age enrolled in the Department of Diagnostic Radiology. These children were observed in the surgical wards of the respective hospital in order to record the results of the operation. Children with ambiguous genitals in the clinical trial and boys unfit for anesthesia / surgery were excluded from the study. After informed consent was obtained, basic demographic information (age) was recorded and the hospital ethics committee was assessed. MRI of all cases was performed in the MR 1.5 Tesla system (Philips Gyro Scan NT, Compact Plus, the Netherlands). Standard MR imaging techniques included axial and coronal images on the T-1, T-2, and Fat Suppression sequences. MRI results were recorded as localized / non-localized testes if they were located in the pouch, pre-scrotum, inguinal canal, pelvis or abdominal cavity, on the right, left or both sides. The MRI results were compared with the surgical results as a reference standard. The information collected was analyzed by the SPSS version. The mean and standard deviation were calculated for quantitative variables such as age and affected side. Qualitative variables from the MRI results included localized / non-localized testes, if located in the sac, pre-scrotum, inguinal canal, pelvis, or abdomen, are presented as frequency and percentage. The sensitivity, specificity, negative predictive value, positive predictive value and diagnostic accuracy of the MRI were calculated by constructing a 2 x 2 table, taking the surgical results as the gold standard.

**RESULTS:**

The age of the patients ranged from 0-16 years. The mean age of the patients was  $5.1 \pm 2.3$  years (Table 1).

**Table 1: Distribution of cases by age (n = 170)**

<b>Age (Year)</b>	<b>n</b>	<b>Percentage</b>
< 5	77	45.3
5-10	83	48.8
11-15	10	05.9

According to the affected side, there were 49 cases (28.8%) on the right side, 93 cases (54.7%) on the left side, and 28 cases (16.5%) on both sides (Table 2).

**Table 2: Distribution of clinically diagnosed undescended testes**

Unilateral				Bilateral	
Right Side		Left Side		No.	%
No.	%	No.	%		
49	28.8	93	54.7	28	16.5

MRI localized 130 (76.5%) of the undescended testes, while 40 (23.5%) of the undescended testes were not MRI (Table 3).

**Table 3: MRI localization of undescended testes**

Findings	No. of testes	Percentage
Localized	130	76.5
Not localized	40	23.5
<b>Total</b>	<b>170</b>	<b>100.0</b>

Of the 130 localized undescended testes, 70 (53.9%) were in the inguinal canal, which appeared to be the most common location of the undescended testes. 37 (28.4%) of undescended testes were found in the pre-scrotum area, 13 (10%) in the pelvis and 10 (7.7%) in the abdominal cavity (Table 4).

**Table 4: Distribution of undescended testes by location on MRI (n=130)**

Location	No. of testes	Percentage
Pre-scrotal area	37	28.4
Inguinal canal	70	53.9
Pelvis	13	10.0
Abdomen	10	07.7

Surgical results revealed the location of 154 undescended tests, while 16 infants were found to have missing testicles during surgery (Table 5).

**Table 5: Surgical findings of localization of undescended testes**

Findings	No. of testes	Percentage
Localized	154	90.6
Not localized	16	09.4

The distribution of testicular locations according to the surgical results also showed that the inguinal canal was the most common location of undescended testes with 73 testes (47.4%). 41 (26.6%) testes were found in the pre-scrotal area, 23 testes (14%) in the pelvis, and 17 testes (11.1%) in the abdominal cavity (Table 6).

Location	Number of testes	Percentage
Pre-scrotal area	41	26.6
Inguinal canal	73	47.4
Pelvis	23	14.9
Abdomen	17	11.1

A comparison between MRI and surgical findings showed that there were 127 true positives, 3 false positives, 27 false negatives, and 13 true negatives (Table 7).

**Table 7: Comparison MRI vs surgery**

MRI	Surgery (Gold Standard)		Total
	Positive	Negative	
Positive	127	3	130
Negative	27	13	40
<b>Total</b>	<b>154</b>	<b>16</b>	<b>170</b>

Statistical analysis of the study showed a sensitivity of 82.4%, a specificity of 81.2%, a diagnostic accuracy of 82.3%, a positive predictive value of 97.6% and a negative predictive value of 32.5% MRI for the location of undescended testes in clinically detected cases of cryptorchidism, considering surgical results to be the gold standard.

**DISCUSSION:**

The embryonic development of the testicle initially takes place in the abdominal cavity. It then advances towards the scrotum in the last trimester and becomes palpable at birth. An undescended testicle refers to the condition in which testicular movement has stopped before reaching the scrotum. Undescended testicle is one of the most common disorders of the genitourinary system in male infants. The undescended testicle presents a particular diagnostic and therapeutic challenge because leaving the testicle in the undescended position increases the risk of malignant degeneration in the future. MRI is considered by many to be the best single imaging method to evaluate undescended testes. Our study results show that MRI is an important sensitive and specific diagnostic tool in detecting undescended testes, with a sensitivity of 82.4%, a specificity of 81.2% and a diagnostic accuracy of 82.3%. These results are consistent with other studies such as: Kanemoto et al. They demonstrated a sensitivity of 86%, a specificity of 79%, and a diagnostic accuracy of 85%. Kamigaito et al. Reported a sensitivity of 85.7% MRI in the preoperative location of undescended testes. The undescended nuclei in our study were well imaged by MRI in both the frontal and axial planes. This result is consistent with Kiere et al, because all detected undescended nuclei were hypointense on T1W and slightly hyperintense on T2W images. The result that cryptorchidism was unilateral in most children, i.e. in 142 (83.5%) and bilateral in 28 (16.5%) cases, is comparable to the study by Dogr et al. According to Shehata and Zakaria, the most common location of the undescended testicle is 53.3% in the inguinal canal, followed by the pre-scrotum (26.7%) and the abdomen (13.3%). Our discoveries are also close to theirs. The most common location of the undescended testicle in our study was the inguinal canal (53.9%). The second common location was the pre-scrotum (28.4%), followed by the pelvis (10%) and abdomen (7.7%) on MRI. Cryptorchidism develops in all boys with plum abdominal syndrome (relaxed musculature of the abdominal wall), in fact it is more common in boys born with abdominal wall defects that cause a decrease in pressure in the abdominal cavity, such as gastroenteritis, and also an omphalocele hernia.

**CONCLUSION**

Magnetic resonance imaging (MRI) has been found to offer a new promising imaging modality for locating undescended nuclei because it has better resolution, multiplanar ability, different sequences, and is safe and secure. In the case of localization of

an undescended testicle, orchidopexy may be planned based on the results of MRI examinations.

**REFERENCES**

1. Awad, Elsayed Ahmed Ibrahim, Abd Ellah Nazeer Yassin, and Maged Mohamad AbdlAziz. "Diagnostic Value of Combined Diffusion Weighted MRI and Conventional MRI in The Diagnosis of Non-Palpable Undescended Testes." *The Egyptian Journal of Hospital Medicine* 77, no. 1 (2019): 4760-4767.
2. Al Wakeel, Adel M., Sameh M. Azab, and Mohamed M. Soliman. "The diagnostic value of magnetic resonance imaging in the diagnosis of nonpalpable undescended testis." *Menoufia Medical Journal* 32, no. 1 (2019): 97.
3. Shin, Jaeho, and G. W. Jeon. "Comparison of diagnostic and treatment guidelines for undescended testis." *Clinical and Experimental Pediatrics* (2020).
4. Yue, Bingqing, Zilian Cui, Weiting Kang, Hanbo Wang, Yuzhu Xiang, Zhilong Huang, and Xunbo Jin. "Abdominal cocoon with bilateral cryptorchidism and seminoma in the right testis: a case report and review of literature." *BMC surgery* 19, no. 1 (2019): 167.
5. D'Amato, D., T. Ranalli, D. Tatulli, F. Bocchinfuso, and G. Manenti. "A MRI Diagnosis of Congenital Urogenital Anomalies in 27 Years Old Man." *J Adv Radiol Med Image* 4, no. 1 (2019): 102.
6. Mathur, Mahan, and Michael Spektor. "Mr imaging of the testicular and Extratesticular tumors: when do we need?." *Magnetic Resonance Imaging Clinics* 27, no. 1 (2019): 151-171.
7. Moghadam, Telma Zahirian, Hamed Mohseni Rad, Hamed Zandian, and Ali Hosseinkhani. "Five testicles in the genital area of a thirteen-month-old baby: a case report." *BMC urology* 20, no. 1 (2020): 1-3.
8. Săftoiu, Adrian, Odd Helge Gilja, Paul S. Sidhu, Christoph F. Dietrich, Vito Cantisani, Dominique Amy, Michael Bachmann-Nielsen et al. "The EFSUMB guidelines and recommendations for the clinical practice of elastography in non-hepatic applications: update 2018." *Ultraschall in der Medizin-European Journal of Ultrasound* 40, no. 04 (2019): 425-453.
9. Shields, Lisa BE, Jeffrey T. White, Dennis S. Peppas, and Eran Rosenberg. "Scrotal Ultrasound Is Not Routinely Indicated in the Management of Cryptorchidism, Retractable Testes, and Hydrocele in Children." *Global Pediatric Health* 6 (2019): 2333794X19890772.
10. Peng, Yang, Longyuan Ouyang, Zhi Lin, Fan Zhang, Huanjun Wang, and Jian Guan. "MRI

findings of nonobstructive azoospermia: lesions in and out of pelvic cavity." *Abdominal Radiology* 45, no. 7 (2020): 2213-2224.

11. Jafarov, V. "Perineal ectopic testis with unilateral scrotal hypoplasia." *Journal of Pediatric Surgery Case Reports* 51 (2019): 101298.
12. Pozza, Carlotta, Riccardo Pofi, Marta Tenuta, Maria Grazia Tarsitano, Emilia Sbardella, Giorgio Fattorini, Vito Cantisani et al. "Clinical presentation, management and follow-up of 83 patients with Leydig cell tumors of the testis: a prospective case-cohort study." *Human Reproduction* 34, no. 8 (2019): 1389-1403.
13. Radmayr, C., G. Bogaert, H. S. Dogan, R. Kočvara, J. M. Nijman, and R. Stein. "EAU guidelines on paediatric urology." In *EAU Guidelines, edition presented at the annual EAU Congress Barcelona*. EAU, 2019.
14. Bhutani, Namita, Pradeep Kajal, and Vijender Sangwan. "Splenogonadal fusion." *Journal of Pediatric Surgery Case Reports* (2020): 101514.
15. Soto-Palou, Francois G., Karina Escudero-Chu, Coriness Piñeyro-Ruiz, Juan Carlos Jorge, and Marcos Perez-Brayfield. "Evaluation and Management of the Undescended Testis in Puerto Rico: A Single Surgeon's 10 Years of Experience." *Puerto Rico Health Sciences Journal* 38, no. 4 (2019).