The Role of MRI Imaging in Evaluation of Ano-Rectal Malformations

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Abstract

MRI is the imaging technique of choice for the global assessment of anorectal malformations. The capability of global visualization of all pelvic floor muscles and its musculofascial support structures make the MRI examination is essential in preoperative assessment for all cases with anorectal malformation in order to plane a good strategy for the reconstructive surgery as well as in assessment of post-operative outcome.

Keyword MRI – Anorectal malformation

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List of abbreviation

ARA	Anorectal Angle
ARJ	Anorectal Junction
ARM	Ano-Rectal Malformation
ASD	Atrio-Septal Defect
ATFP	Arcus Tendineus Fascia Pelvis
ATLA	Arcus Tendineus Levator Ani
CT	Computed Tomography
EAS	External Anal Sphincter
ES	External Sphincter
FSE	Fast Spin-Echo
GRE	Gradient-Echo
I	Ischial
IAS	Ischio-Anal Space
IS	Internal Sphincter
LA	Levator Ani
MCUG	Micturating Cystourethrography
ml	Millilitre
mm	Millimetre
MRI	Magnetic Resonance Imaging
PCL	Pubo-Coccygeal Line

PRM	Puborectalis Muscle
PSARP	Posterior Sagittal Anorectoplasty
R	Rectum
SSFSE	Single-Shot Fast Spin Echo
TE	Echo Time
TR	Repetition Time
U	Urethra
UB	Urinary Bladder
UG	Urogenital
US	Ultrasound
VSD	Ventricluo-Septal Defect

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INTRODUCTION

Anorectal malformations comprise a wide spectrum of disease affecting males and females and can involve malformations of the distal anus and rectum, as well as the urinary and genital tracts. Malformations range from minor easily treated defects that have an excellent functional prognosis to complex defects that are difficult to manage, often associated with other anomalies, and have a poor functional prognosis ***(Levitt and Pena, 2006)***.

Anorectal malformations occur in approximately 1 in 5000 live births. Visualization of the anatomy allowed surgeons to eliminate many previous misconceptions. For instance, the previous classification of these defects into high, intermediate, and low malformations was a misleading oversimplification that did not adequately demonstrate the spectrum of anorectal anomalies ***(Levitt and Pena, 2006).***

Pelvic floor anatomy and function, especially in patients with congenital malformations, such as anorectal malformations (ARMs), bladder exstrophy (BE), and cloacal exstrophy (CE), are often very complex ***(Boemers et al ,2006)***.

Diagnosis and early management has been refined by more thorough knowledge of the anatomy and physiology of the pelvic structures at birth. Analysis of large series of patients allows better prediction of associated anomalies and functional prognosis (***Levitt and Pena, 2006).***

Initial descriptions of the normal anatomic features of the anal canal were based on dissection studies and observations during surgery. Introduction of MRI imaging techniques opened new possibilities for evaluation of the pelvic structures ***(Rociu et al, 2000)***.

MRI is an imaging technique for the global assessment of pelvic floor disorders. The capability of global visualization of all pelvic compartments and pelvic floor muscles, the enhanced tissue resolution of the pelvic organs, and its musculofascial support structures reinforced the interest of this method in the assessment of anorectal malformations ***(Wefer et al, 2002)***.

Despite surgical correction of complex urogenital and ARMs, patients may still present with urinary and fecal incontinence or constipation. The reasons for incontinence or constipation may be structural or functional or a combination of both ***(Fritsch et al, 1999)***.

To better differentiate these different aspects, dynamic MRI of the pelvic floor can be very helpful to delineate not only anatomy but also the function of the continence organs. In these cases, the structure, quality, and function of the levator plate and the anal sphincter complex are of special interest for the pediatric surgeon. In managing incontinence in these patients, there is interest to define the puborectalis muscle as a part of the sphincter complex ***(Boemers et al, 2006)***.

Compared with other techniques, the advantage of MRI is its superior soft tissue resolution and the global view of different pelvic compartments without ionization radiation. Furthermore, information regarding the function of pelvic floor muscles and organs during different actions (rest, stretch, squeeze, evacuation) is obtained in the growing cooperative child. Especially in the growing child, the absence of ionizing radiation is of utmost importance ***(Boemers et al, 2006)***.

AIM OF WORK

The aim of this work is to highlights the role of MRI studies in evaluation of anorectal malformations prior to surgery as well as the assessment of the surgical outcome.