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The role of computerized tomography in the management of anorectal malformations (*)

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Summary

During 1987-1990, twelve patients, 9 for congenital anorectal malformations and 3 for incotinence after pullthrough operations were admitted and examined by clinical, conventional radiological and Cumputerized Tomography (CT) investigations preoperatively.

Colostomy and/or radical operations (posterior sagittal anorectoplasty=PSARP) were performed in 9 and secondary repairs were done in 3 patient. All preoperative studies were compared with the operative findings.

CT evaluations of the terminal bowel, the level of fistula, the condition of pelvic muscles were all confirmed by the operative findings in all 9 patients. However, conventional radiologic studies were inadequate in 8 and misleading in 3 patients, while confirmed only in one patient.

Patients were reexamined postoperatively. CT showed well developed muscle complexes and centrally located neorectums in all patients who had PSARP and secondary operations. However, the conventional studies were inadequate to evaluate these structures postoperatively.

It was concluded that CT can be very useful in the diagnosis and management of anorectal mamlformations, since the level of the terminal bowel, its fistu la and pelvic muscles can be accurately and clearly demonstrated.

Key words: *Anorectal Malforations, Computerized tomography, posterior sagittal anorectoplasty (PSARP)*

Introduction

Localization of rectal pouch, its fistula and identifying the pelvic muscles as levators and sphincter muscle complex (SMC) are all important in the diagnosis and management of anorectal malformations (ARM) [1-14].

Conventional radiographic studies such as invertography [14], prone cross table lateral graphy [10], opaque material injection [9], fistulography and colostography [1,12,13,14], ultrasonography [3], and recently Computerized Tomography (CT) [1,4,6,7,8] and Magnetic Resonance Imaging (MRI) [8] are the methods used to diagnose and evaluate ARM up to date.

We have studied 12 children with ARM to evaluate the role of CT in the diagnosis and management of ARM.

Materials and Methods

Twelve children with ARM, aged between 1 day and 14 years, between 1987 and 1990, were examined by CT in addition to the conventional radiographic and ultrasonographic studies.

Four patients had high, 5 had low anomalies, 3 patients had incontinence after unsuccesful operations.

It was possible to put the babies into the gantry in axial, sagittal and coronal positions; and so the sections of these planes could be obtained. In 3 older children (Case No 10,11,12) sagittal and coronal reconstructions were obtained from axial sections. Axial sections were obtained from the vertex of bladder to the perineal skin at 1 cm intervals parallel to the pubococcygeal plane. Iohexol 10 % was used as a contrast material in patients with fistula of colostomy.

After the evaluation of patients, colostomy or radical operation (Posterior Sagittal Ano rectoplasty=PSARP) were performed with the use of muscle stimulator. Operative findings were compared with preoperative fin-

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Table 1. Evaluation of 9 cases with congenital anorectal malformations

Case		Age Sex	Type of anomaly	Rectal X-Ray	Pouch-Skin CT	Operative findings
1	AÖ	1/365 M	High R-U-F	2.5 cm	3 cm R-Pr-U-F SMC good	Pouch-Skin 3 cm R-Pr-U-F SMC well developed
2	AB	1/365 M	High R-U-F	2 cm	2 cm R-Pr-U-F SMC good	Pouch-Skin 2 cm R-Pr-U-F SMC well developed
3	EK	2/12 M	High R-U-F	?	3 cm R-Pr-U-F SMC good	Pouch-Skin 3 cm R-Pr-U-F SMC well developed
4	BY	1/365 M	Low	5 cm?	0.5 cm SMC good	Pouch-Skin 0.5 cm SMC well developed
5	BS	2/365 M	Low	1 cm	0.5 cm SMC good	Pouch-Skin 2.5 cm R-Pr-U-F SMC well developed
6	AE	10/12 M	High R-U-F	?	2.5 cm R-Pr-U-F SMC good	Pouch-Skin 2.5 cm R-Pr-U-F SMC well developed
7	AÖ	2/12 M	Low Perineal-F	1.5 cm	2 cm Perineal-F SMC good	Pouch-Skin 2. cm Perineal-F SMC well developed
8	AŞ	14/365 F	Low R-Vest-F		SMC good	SMC well developed
9	GÇ	15/365 M	Low R-Vest-F		SMC good R-Vest -F	SMC well developed R-Vest-F

SMC: Sphincter muscle complex
R: Recto, U: urethral, F: Fistula, Vest: Vestibular
Pr: Prostatic

Table 2. Evaluation of 3 patients with unsuccessful pullthrough operations

Case	Age	Type of anomaly	Preop CT findings	Postop CT findings
1 NÖ	14y F	R-Vest-F operated	Rectum eccentric SMC disrupted	Neorectum central SMC inadequate
2 MÖ	9y M	R-U-F operated	Rectum eccentric SMC disrupted	Neorectum central SMC inadequate
3 HS	7y F	R-Vest-F operated	Rectum eccentric SMC disrupted	Neorectum central SMC inadequate

dings. Postoperatively all the patients were examined by clinical, radiological and CT studies.

Results

The results of the evaluation of 9 patients with anorectal malformations and 3 patients with unsuccessful pullthrough operations were shown on Table 1 and Table 2, respectively.

By CT studies, the level of rectal pouch and its fistula measurements were accurate in all patients as confirmed by operative findings, while the conventional studies were found misleading. Moreover, the levators and the sphincter muscle complex (SMC) were also evaluated by CT. In 9 patients who had PSARP operations and in 3 who had secondary repairs, postoperative CT showed the centrally located neorectum through the properly placed pelvic muscles in all.

Clinical results were good in all 9 patients after primary PSARP operations, and 2 good and 1 satisfactory results after secondary repairs.

Discussion

Classification of ARM as a high or low anomaly is not always satisfactory. The identification of the fistula, the status of sacrum, vertebrae, the levators and SMC are all important in determining the preoperative and postoperative management of anorectal malformations [1-14]. The higher the level of the rectal pouch from perineal skin, the more severe is the anomaly with its associated defect, and th epoorer is the prognosis regarding the functions of defecation and continence [11,12,13,14].

Diagnostic methods used up to date can be classified as follows: 1) Clinical observation [12,13,14]; 2) Conventional radiographic investigations such as invertography [12,13,14], cross-table lateral graphy [10], perineal opaque injection [9], fistulography and colos-tography [1,12,13,14]; 3) Ultrasonography [3], and recently 4) CT and MRI studies [1,4,6,7,8].

Although the fistulous opening site may give some idea about the level of the rectal pouch, further investigations should be carried out. If there is no fistula, opaque injection by perineal punction may be useful. If there is fistula or colostomy, fistulography

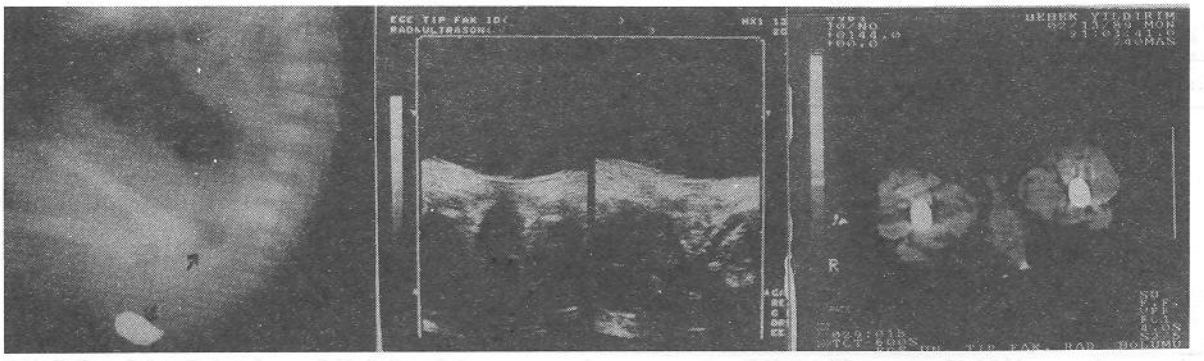

Fig 1. Invertography (left) and Ultrasonography (middle) showing high anomaly, while CT (right) showing how anomaly in Case 4.

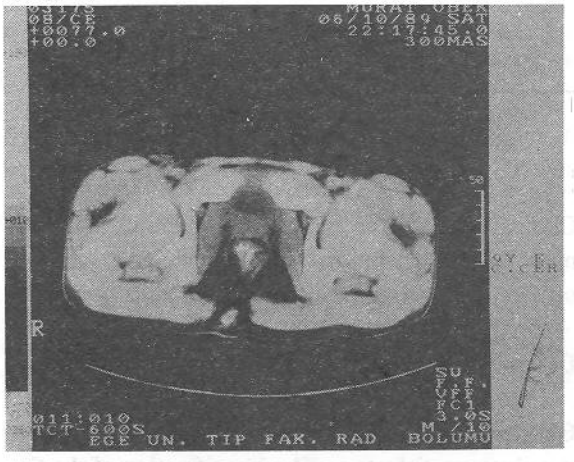

Fig 2. Large and displaced distal bowel in Case 2 (Table 2).

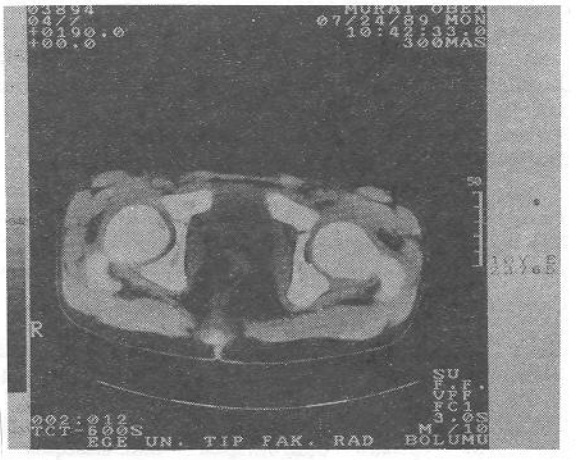

Fig 3. CT showing centrally located neorectum between the sufficient muscle complex.

and/or colostography should be done to determine the level and the diameter of rectal pouch [12,13,14]. Ultrasonography, as a noninvasive study, can be used to demonstrate the level of rectal pouch [3]. However, radiography and ultrasonography can only show the bowel gas and bony structures, and they can not give detailed information about the pelvic muscles and soft tissues. Therefore, they may be misleading in identification and treatment of ARM [1,3-10].

CT can clearly and accurately differentiate the bowel gas, pelvic muscles, soft tissues, bony structures and the associated anomalies as well [1,4,6,7,8].

Conventional radiographic studies were not accurate in the majority of our cases (Tablo 1), except in one case (Case No 2) in which they were confirmed by operative findings. In Case No 4, invertography and ultrasonography mistakingly showed high anomaly, which was identified as low anomaly by operative findings and CT studies (Fig 1). Furthermore, these studies could not give any information about the status of levators and SMC, which are very important in continence mechanism.

In patients with unsuccessful anorectoplasty, it is very important to evaluate the position of neorectum and the condition of levators and SMC [1,5,11,13]. These can be demonstrated by CT [1,4,6,7,8]. Generally, the problem is the very large and displaced distal bowel and/or the disrupted muscles [1,5,11,13], as in our Cases No 1,2,3 (Tablo 2) (Fig 2). Good functional results were obtained after operative correction of these cases with the aid of muscle stimulator (Fig 3).

We can conclude that obtaining axial, sagittal, coronal sections and reconstructions of these planes, CT can clearly demonstrate the level of bowel, its fistula and the status of pelvic muscles. Therefore, CT can

be a very useful guide for the primary or secondary operations of children with anorectal malformations.

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