

Diffusion-Weighted Imaging Features of Urachal Abscess

Case Report

Urakal Absenin Difüzyon MR Görüntüleme Bulguları Olgu Sunumu

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ABSTRACT

We report the diffusion-weighted imaging findings (DWI) of a case with urachal abscess. Magnetic resonance imaging revealed an enhancing thick, walled cystic mass arising from the superior surface of the urinary bladder and extending to the level of the umbilicus. DWI revealed restricted diffusion of the cyst content consistent with abscess formation with an ADC value of $0.76 \times 10^{-3} \text{ mm}^2/\text{s}$.

Key words: *Pyourachus, Urachal abscess, Urachus, Magnetic resonance imaging, Diffusion-weighted imaging*

ÖZET

Bu olgu sunumunda urakal abseli olguda difüzyon MR görüntüleme özelliklerini tanımladık. MRG'de mesane üst duvarından umbilikus seviyesine uzanan, kalın duvarlı, kontrastlanan kistik kitle saptandı. Difüzyon MR'da abse ile uyumlu difüzyon kısıtlılığı ve düşük ADC değeri bulundu ($0.76 \times 10^{-3} \text{ mm}^2/\text{s}$).

Anahtar Kelimeler: *Pyourachus, Urakal Abse, Urakus, MR Görüntüleme, Difüzyon MR Görüntüleme*

INTRODUCTION

The urachus is an embryonic remnant resulting from the involution of the allantoic duct and the ventral cloaca. The tubular urachus normally involutes before birth, remaining as a fibrous band with no known function. Abnormal persistence of the urachal patency may result in various clinical problems at any age (1).

Since, the urachal remnant diseases are uncommon and manifest with nonspecific abdominal or urinary signs and symptoms, definitive presurgical diagnosis is not easily made (2).

In the present case we report the diffusion-weighted imaging (DWI) findings of an urachal abscess for the first time, which led excellent demonstration of the disease.

CASE REPORT

A 14-year-old girl presented with a 10 days history of lower abdominal pain. Physical examination revealed periumbilical erythema, abdominal tenderness, and fever of around 38,5°C. Laboratory examinations showed, increased white blood cell count (13 440/ μ) and C-reactive protein concentration (10 mg/dL). Abdominal ultrasound demonstrated a thick walled supravescical cystic mass. Under the impression of intraabdominal abscess or cystic tumor, pelvic magnetic resonance imaging (MRI) was performed on a 1.5 T MR scanner. Following routine pelvic sequences and before contrast material administration, free-breathing single-shot spin-echo DWI was obtained with high b value ($b=0,500,1000$). A markedly enhancing, irregular thick walled cystic mass consistent with abscess formation was detected. The ovaries and the uterus were totally normal in appearance. DWI revealed restricted diffusion of the abscess content. The calculated ADC of the abscess cavity was $0.76 \times 10^{-3} \text{ mm}^2/\text{s}$ (Figure 1). According to the location of the

lesion, the diagnosis of urachal abscess was made. The pain was relieved after the administration of antibiotic treatment for one week and then the abscess and the urachal remnants were resected completely. The final pathological diagnosis was infected urachal remnant without a tumoral focus. The post-operative course was uneventful.

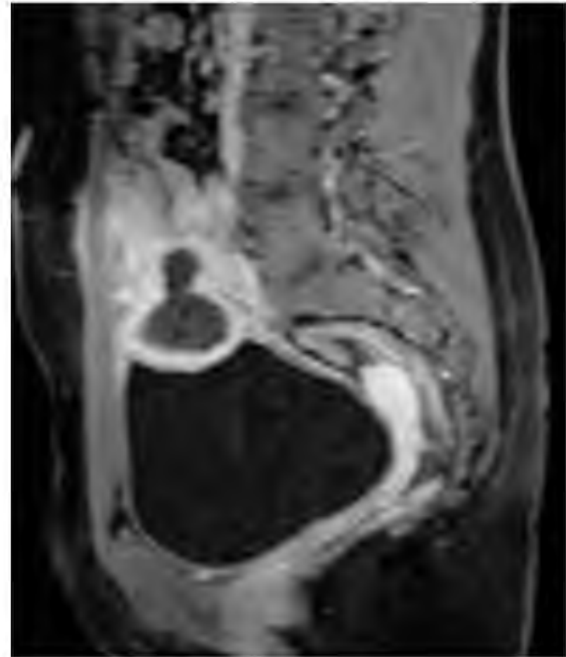


Figure 1 (a): 12-year-old girl with a urachal abscess. Sagittal



Figure 1 (b): axial post contrast 3D GRE T1 (VIBE) image demonstrates an irregular thick walled cystic mass at the superior surface of the bladder

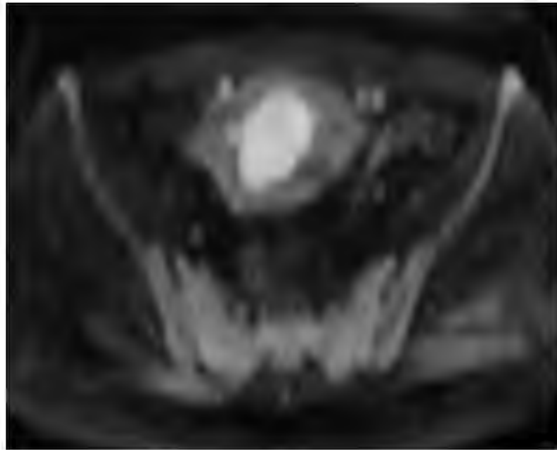


Figure 1 (c): DWI of the mass reveals restricted diffusion of the cyst content consistent with urachal abscess ($b=1,000$ s/mm²)

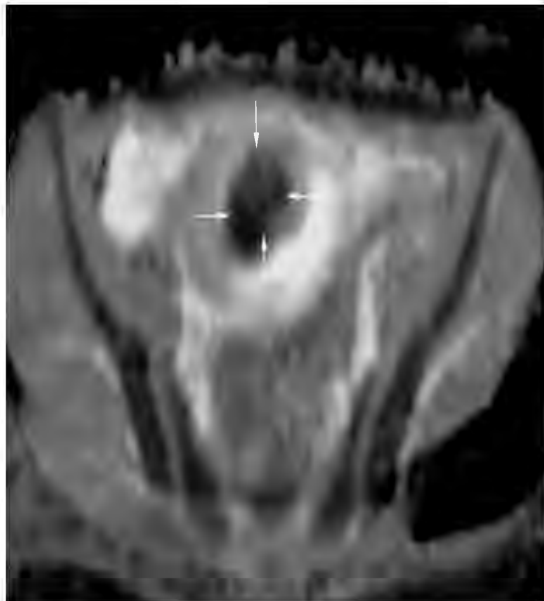


Figure 1 (d): Apparent diffusion coefficient was calculated. Region of interest was placed on the cyst cavity (not shown on the image). ADC was 0.76×10^{-3} mm²/s, (arrows: abscess content)

DISCUSSION

In early fetal life, the allantois connects the urogenital sinus with the umbilicus. Normally, the allantois is obliterated during development and is replaced by a fibrous cord known as the urachus or median umbilical ligament. Failure of fibrous closure of the allantois results in a variety of urachal remnants. Incomplete obliteration of the urachal lumen results in

the following five anomalies: congenital patent urachus, umbilical urachal sinus, vesicourachal diverticulum, urachal cyst, alternating sinus (3).

A patent urachus is a fistula between the bladder and the umbilicus. The disorder is usually manifested clinically by urine draining from the umbilicus. In a urachal sinus, the urachus is patent only at the umbilicus. This rare congenital lesion is usually associated with a urachal cyst. In a urachal diverticulum, the urachus communicates only with the bladder dome. Urachal diverticula account for 3% of all urachal anomalies and usually become symptomatic in adults. In a urachal cyst, both ends of the cystic dilatation of the urachus are closed. Urachal cysts are the most common urachal abnormality representing 30% of all urachal anomalies. An alternating sinus is a cystic dilatation of the urachus that periodically empties into the bladder or the umbilicus. It is a very rare anomaly whose clinical and radiologic characteristics are similar to those of the urachal sinus (4).

The most common complication of urachal anomalies is infection, which occurs in 23% of symptomatic cases (5). Other complications include intestinal obstruction, urinary tract lesions, hemorrhage into the cyst, and rupture causing peritonitis. The route of infection may be lymphatic, hematogenous, or vesical, and a wide variety of gram-positive and gram-negative microorganisms have been cultured from infected urachal remnants (1).

Since some cases of infected urachal cysts are detected after complication by severe infections such as sepsis, rapid establishment of appropriate therapeutic tactics is required in such cases. Sepsis secondary to rupture of a urachal cyst is a surgical emergency and must be managed differently to elective excision of a cyst (6). Minevich et al.(7) noted that an advantage of the staged approach is that initial drainage may allow more rapid

resolution of adjacent inflammatory processes, resulting in an easier subsequent surgical procedure with less risk of postoperative complications.

Kojima et al. (6) have reported rupture of the abscess secondary leading to peritonitis during medical palliation previous to the surgery.

These infected remnants are frequently confused with a wide spectrum of midline intraabdominal or pelvic inflammatory disorders at clinical examination and with malignant tumors at imaging (2).

Complex echogenicity at ultrasonography and inhomogeneous attenuation with variable contrast enhancement in and around the disease process at computed tomography make it difficult to differentiate an infected urachal remnant from urachal carcinoma.

Nakajo et al. (8) have described the FDG PET findings of an urachal abscess, with an increased uptake. However we believe that DWI is a more suitable technique with more detailed anatomy and no radiation exposure. DWI is completely noninvasive, does not require ionizing radiation or injection of contrast material, and does not cause patient discomfort. It can be added to an MR examination protocol because it requires only a very short prolongation of examination time.

In summary, urachal abscess may present only with abdominal pain. In spite of rarity, it should not be ignored in differential diagnosis of abdominal pain. MRI is an excellent diagnostic tool for suspected cases of urachal lesions and particularly with the suspicion of infection or malignancy diffusion-weighted imaging is a non-invasive new useful technique to establish the diagnosis.

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