Prostatic Abscess: what is the modality of choice MRI or TRUS?

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Learning objectives

Both MRI and transrectal ultrasound are radiological means for management of prostatic abscess. MRI is a main diagnostic method, and transrectal ultrasound in an experienced hand can yield high diagnostic performance beside its role in guiding drainage. Successful treatment of prostatic abscess depends not only on proper systemic antibiotic therapy but also on effective drainage for which transrectal ultrasound is globally available.

We propose to present these points:

- Illustrate the appearance of prostatic abscess on MRI different sequences.
- Illustrate the appearance of prostatic abscess on transrectal ultrasound and its use for drainage.
- Illustrate the differential diagnosis for cystic conditions that may mimic prostatic abscess and are encountered in practice.
Background

**Clinical background:**

Prostatic abscess is an uncommon condition, often difficult to discern clinically from acute prostatitis. Prostatic abscess has remained a serious disease, and delay in adequate treatment may result in death. The mortality rate of prostatic abscess has been estimated to range between 3% and 30%. This may be due to non specific symptoms of the disease. It results from focal accumulation of pus within the prostate gland. Historically, the common infecting organisms were Neisseria gonorrhoeae, Staphylococcus aureus and Mycobacterium tuberculosis. However, more recently, gram negative bacteria, such as Escherichia coli, are causative species. Prostatic abscess mainly affects diabetic and immunosuppressed patients. Common presenting features are dysuria, fever, suprapubic pain and/or urinary retention. Urine examination usually reveals pus cells.

**Transrectal Ultrasound:**

Since it has been introduced by Watanabe and associates in 1971, Transrectal ultrasound (TRUS) has remained the leading imaging modality for management of prostatic abscess. There is usually a cystic lesion with thickened walls, septations, and/or heterogeneous echoes inside with increased perilesional blood flow, is seen in a patient with appropriate clinical findings.

**MR techniques**

MRI can non-invasively diagnose prostatic abscess, also it views the periprostatic and pelvic tissues with excellent tissue characterization and whether there is lesion extension into these tissues or not. Pulse sequence selection determines the MR appearance of prostatic abscess;

MRI signal characteristics of an abscess include:

- **T1:** hypointense
- **T2:** hyperintense
- **C+ (Gd):** tends to show peripheral contrast enhancement.
- **DWI:**
  - tends to show restriction of diffusion corresponding to hypoechoic lesions on ultrasound
- **ADC:**
  - mean ADC values within the abscesses have been reported to be very low
**Treatment:**

In the past, transurethral drainage was the first choice for therapy. Today, percutaneous transperineal or transrectal drainage under transrectal sonography is the first choice for therapy because of the low risk of complication. Once an abscess of the prostate is diagnosed, anaerobic antimicrobial therapy should be added and transrectal or percutaneous transperineal aspiration and drainage is required. Some authors consider the percutaneous transperineal drainage to be the most effective and safest solution.

**Differential Diagnosis:**

A. **Intraprostatic Cystic Lesions:**

1. Müllerian duct cysts and prostatic utricle cysts:

   Müllerian duct cysts may originate from the region of the verumontanum but usually extend above the prostate and may be slightly lateral to the midline. They do not communicate with the urethra. Prostatic utricle cysts always arise from the verumontanum and are always in the midline, and they communicate with the urethra.

   On aspiration, müllerian duct cysts never contain spermatozoa, whereas utricle duct cysts occasionally do. Both müllerian duct cysts and prostatic utricle cysts can become infected and may contain pus or hemorrhage, which can cause confusion on imaging because the appearances overlap those of abscess and cystic tumor of the prostate.

2. Ejaculatory duct cysts:

   These lesions appear to be cystic structures along the ejaculatory duct just lateral to the midline in the central zone of the prostate. However, when they are large, they may extend cephalad to the prostate and appear to arise centrally. On aspiration they contain fructose or spermatozoa. Ejaculatory duct cysts commonly contain calculi. Sometimes they may contain pus or hemorrhage. There may be associated cystic dilatation of the seminal vesicle on the same side

3. Prostatic retention cysts:

   Retention cysts usually appear as smooth-walled, unilocalur simple cysts. They rarely cause symptoms. They never contain spermatozoa on aspiration.

4. Cystic degeneration of benign prostatic hypertrophy:
Cystic degeneration of BPH nodules is common and accounts for most prostatic cystic lesions. Cystic lesions resulting from cystic degeneration of BPH are located in the transition zone of the prostate along with BPH nodules. They may be seen in irregular shapes and various sizes and may contain hemorrhage or calculi.

5. Cysts associated with tumors:

Both benign and malignant prostate neoplasms may contain cystic components. Multilocular prostatic cystadenoma is a rare benign tumor that can grow to a large size.

B. Periprostatic Cystic Lesions:

1. Seminal vesicle cysts:

They are commonly associated with adult polycystic kidney disease. Aspiration of seminal vesicle cysts yields spermatozoa and sometimes hemorrhage.

2. Cysts of the vas deferens:

These cysts are located superior to the prostate gland along the course of the vas deferens. On MRI, vas deferens cysts are easily recognized and distinguished from other adjacent structures.

3. Cowper's duct cysts:

The Cowper's (bulbourethral) glands are found in the urogenital diaphragm immediately inferior to the prostate. The Cowper's gland ducts drain into the bulbous urethra, and obstruction of these ducts may cause retention cysts. Cowper's duct cysts may be congenital or acquired, usually due to trauma or infection. Larger cysts may present with hematuria or urinary obstruction and, potentially, male infertility.

C. Entities That May Mimic Prostatic and Periprostatic Cystic Lesions

1. Defect from transurethral resection of the prostate
2. Hydroureter and ectopic insertion of the ureter
3. Bladder diverticulum
4. Prominent seminal vesicles
Fig. 1: 49 year aged male with prostatic abscess. Axial transrectal ultrasound image showing a thick walled cystic lesion at the central zone. Aspiration revealed thick pus.

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Fig. 2: 64 year aged male with prostatic abscess. Axial T2 weighted MRI showing a multilocular hyperintense well circumscribed lesion at the left side of the prostate.

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Fig. 3: The same patient as Fig.2, Sagittal T2 weighted MRI showing the hyperintense cystic lesion.

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**Fig. 4:** The same patient as in Fig. 2 and 3. DWI showing the restriction of diffusion of the lesion.

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Findings and procedure details

TRUS usually reveals well-defined hypoechoic areas showing internal septations and echoes with thin or thick walls and surrounding edema in cases of mature abscess. In cases of immature abscess, sometimes it is difficult to differentiate the acute prostatic infection from other focal lesion by TRUS.

MRI using conventional T1w & T2w techniques can detect the mature large lesions, Diffusion weighted MRI and dynamic contrast enhanced MRI of the prostate can detect early acute infection of the prostate with extraprostatic extension paving a road map for appropriate management way.

Diffusion weighted MRI can detect early changes at the prostate before liquifaction. The preliquifaction acute prostatitis appears as area with diffusion restriction and Low ADC map, with lesion liquifaction the ADC will start to increase.

At follow up after abscess drainage DWI can differentiate residual or recurrence with diffusion restriction from post-drainage fibrosis without diffusion restriction.
Conclusion

MRI the modality of choice in early detection of acute prostate infection using DWI and dynamic enhanced study. TRUS is an important tool in guidance for aspiration and drainage of prostatic abscess.

DWI has a high accuracy in diagnosis of prostate abscess and detect recurrence at follow up with comparable results to contrast enhanced MRI. The low cost, short exam duration, lack of gadolinium use and the non-invasiveness make DWI preferable as the first diagnostic test in prostate inflammatory disease.
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