

# Imaging Findings of Perineal Disease<sup>1</sup>

Young-Rae Lee, M.D., Hae-Won Park, M.D., Shin-Ho Kook, M.D.,  
Chang-Suk Lee, M.D.

The perineum is defined as the region of body below the pelvic diaphragm that lies within the boundaries of the pelvic outlet. It is the region which is home to pathologic conditions which include primary tumors, neoplasms of adjacent organs with secondary involvement, congenital or acquired cystic lesions and inflammatory lesions. In this article, we describe CT and MR imaging anatomy and various pathologic processes that affect this anatomic region, with a brief discussion. Emphasis is given to imaging features that help to characterize specific lesions.

**Index words :** Pelvic organs, abnormalities  
Pelvic organs, inflammations  
Pelvic organs, neoplasms  
Pelvic organs, CT  
Pelvic organs, MR

Although pathologic conditions involving the perineum are uncommon, a knowledge of its anatomy and expected pathologic entities is useful which interpreting CT and MR images. The purpose of this article is to demonstrate the CT and MR imaging anatomy of the perineum and to review the imaging findings of a spectrum of pathologic processes that affect this anatomic region. These processes include primary tumors, such as aggressive angiofibroma, rhabdomyosarcoma and leiomyosarcoma; secondary involvement by anal or urethral neoplasms; congenital and acquired cystic lesions, such as tailgut cyst, Bartholin's duct cyst, lymphocele and mucocele; and inflammatory lesions.

## Normal Anatomy

The perineum is divided into two triangles, an anterior urogenital triangle and posterior anal triangle (Fig. 1).

The former is bounded laterally by the ischial rami and anteriorly by the pubis, and divided by fascial layers into a superficial and deep perineal space, the latter being almost synonymous with the urogenital diaphragm. The ischioanal fossa is the largest of the fossae in the posterior anal triangle, and is bounded medially by the

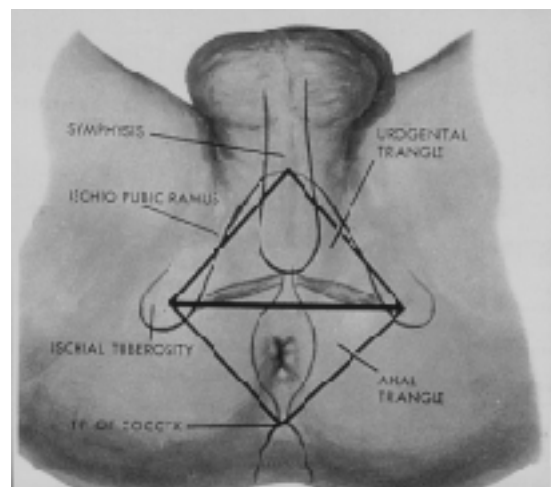


Fig. 1. Normal anatomy. Diagram illustrates two triangles of perineum, which are anterior urogenital and posterior anal triangle. An imaginary line connecting the ischial tuberosities defines the posterior boundary of the urogenital triangle.

<sup>1</sup>Department of Radiology, Kangbuk Samsung Hospital, School of Medicine, Sungkyunkwan University  
Received March 10, 1999 ; Accepted May 11, 1999  
Address reprint requests to : Young-Rae Lee, M.D., Department of Radiology, Kangbuk Samsung Hospital  
#108 Pyung-Dong, JongNo-Ku, Seoul 110-102, Korea.  
Tel. 82-2-739-3211 Fax. 82-2-738-1369 E-mail. lesiles@chollian.net

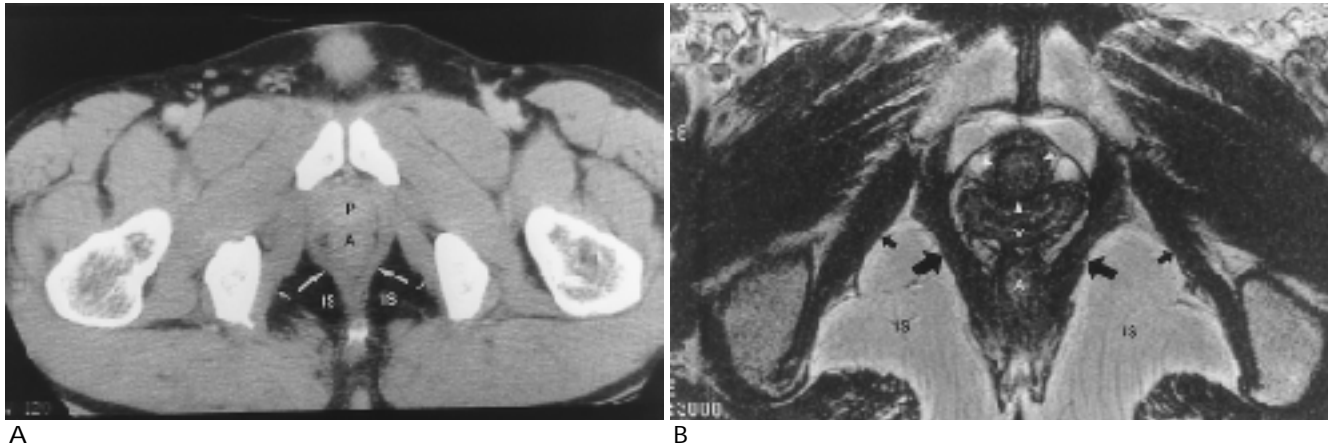


Fig. 2. Normal anatomy. Axial CT scan of male (A) and T2 weighted FSE (TR/TE, 3000/90) MR image of female (B) shows normal anatomic structures of the perineal region: ischioanal fossa (IS), vagina (V), anal canal (A), prostate (P), levator ani muscle (long arrows), urethral wall (arrowheads), internal obturator muscle (short arrows).

levator ani and external anal sphincter muscles. The levator ani muscle separates the ischioanal fossa from the extraperitoneal space of the pelvis (supralevator space) and constitutes the most important surgical landmark of the region (1). The normal imaging anatomy of the perineum is shown in Fig. 2.

### Primary Malignancy

The most typical primary tumor of the perineum is aggressive angiosarcoma. The tumor a rare mesenchymal neoplasm found mainly in the young female, is characteristically a nonmetastasizing tumor of the soft tissue of the pelvis and perineum that is locally infiltrative and frequently recurs. CT of aggressive angiosarcoma usually appears as a homogenous, slightly hypoattenuating

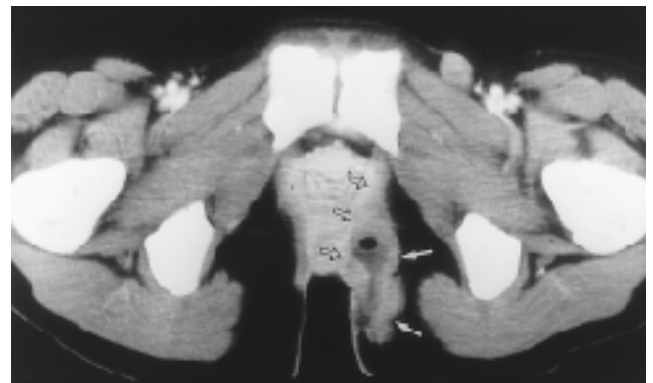


Fig. 4. Embryonal rhabdomyosarcoma in a 26-year-old female with a palpable perineal mass for 2 months. Contrast-enhanced CT scan shows lobulated, heterogeneously enhancing mass (arrows) in the left perineum, adjacent to levator ani muscle and vaginal wall, which was confirmed to embryonal rhabdomyosarcoma arising from the left external sphincter muscle and invasion to the posterior vaginal wall.



Fig. 3. Aggressive angiosarcoma in a 26-year-old female with right labial swelling. Contrast-enhanced CT scan of pelvic floor shows a soft-tissue mass infiltrating right ischioanal fossa & labium (arrows). Note the strong enhancement of mass may be explained by the abundant blood vessels within tumor.

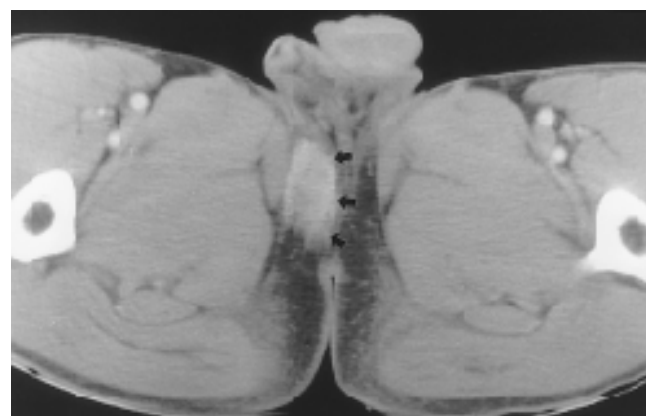
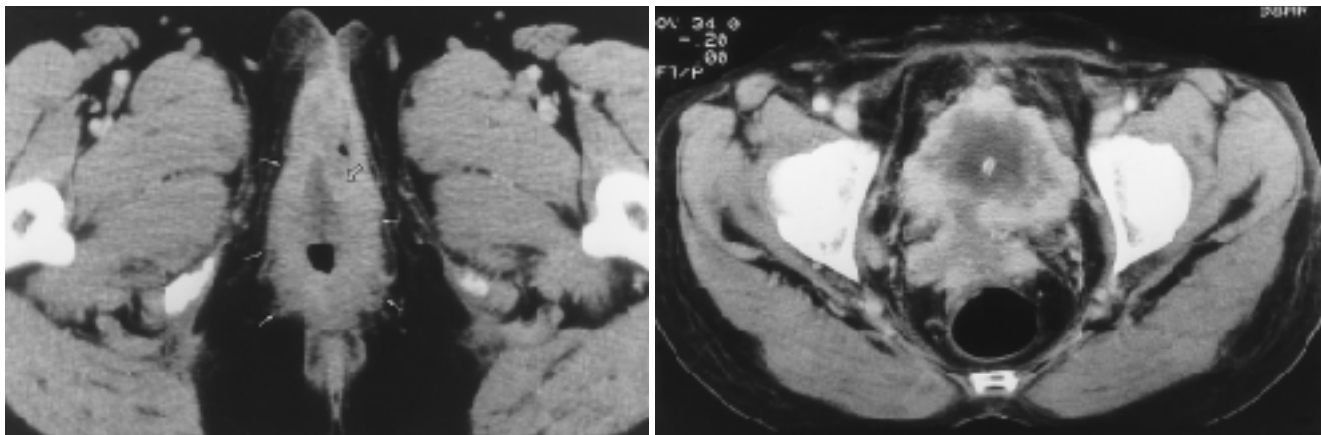


Fig. 5. Perineal leiomyosarcoma in a 58-year-old male with a palpable perineal mass. Contrast-enhanced CT scan shows poorly marginated infiltrative mass in the right perineum, encroaching crus of penis (arrows). It shows peripheral enhancement and central necrosis.



**A** **B**  
 Fig. 6. Urethral squamous cell carcinoma in a 56-year-old with urethral bloody spotting for several years. Left labial swelling and hard vestibule was found on physical examinations.  
 A. Initial contrast-enhanced CT scan shows round soft-tissue mass between anus and vagina (arrows). Intratumoral gas shadow may be explained by urethrovaginal fistula.  
 B. CT scans obtained 1-month later shows bulky mass extending to bladder and rectum.

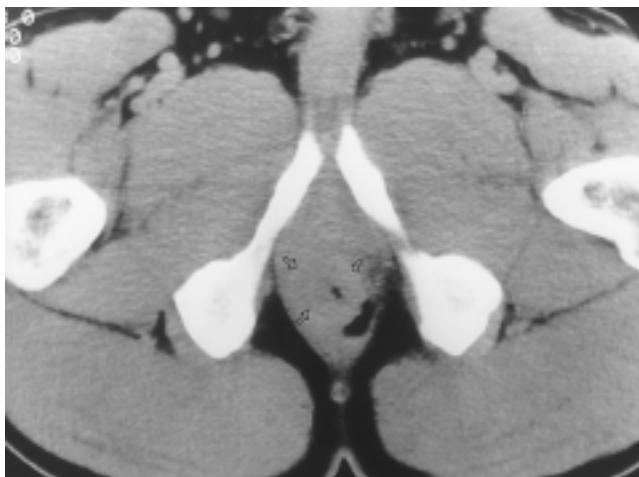


Fig. 7. Cloacogenic carcinoma in a 20-year-old male with anal bleeding. Contrast-enhanced CT scan shows well-defined, round, intraluminal mass of anus (arrows). Note the central air shadow due to previous biopsy.

or isoattenuating mass with strong enhancement (Fig. 3), a fact due to the myxomatous component of the tumor, with its abundant blood vessels (2).

The most commonly involved sites of genitourinary rhabdomyosarcomas are the bladder, prostate, paratesticular region, vagina, and uterus. Involvement of the perineum is rare (3). Perineal leiomyosarcomas are also rare aggressive tumors that are typically of an extensively infiltrating nature by the time of diagnosis. The CT findings of perineal rhabdomyosarcoma and leiomyosarcoma have not been fully described. In our cases, CT demonstrated a soft tissue mass with central necrosis (Fig. 4) and an infiltrative soft tissue mass (Fig. 5) of the

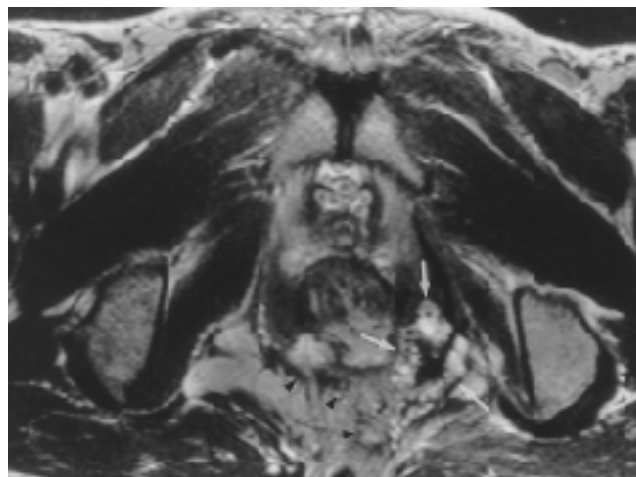


Fig. 8. Fistulous cancer in a 37-year-old male with recurrent anal fistula. FSE T2 weighted axial MR image (TR/TE, 3000/90) shows curvilinear area of high signal intensities (arrows) on just posterior to the left levator ani muscle which confirmed to an mucinous adenocarcinoma in anal fistulous tract, associated with multiple abscesses and granulomas. Note the irregular fibrotic scarring and multiple abscesses around anus (arrowheads) representing acute and chronic inflammations.

perineum.

#### Neoplasms of Adjacent Organs with Secondary Involvement

Neoplastic involvement of the perineum is most often secondary to direct extension of primary anorectal, prostatic and genital tumors. The perineum is frequently the site of a recurrent tumor after abdominoperineal resection of rectal adenocarcinoma. Pelvic tumors can be

spread to the perineum by anatomical communications such as the spermatic cord and round ligament.

Primary urethral carcinoma is a rare condition and occurs more frequently in women. Tumors tend to arise in the distal two-thirds of the urethra, and most are squamous cell carcinoma. Diagnosis is usually made on the basis of a periurethral mass discovered during physical examination (Fig. 6)(4).

Cloacogenic carcinoma (Fig. 7), a variant of anal squamous cell carcinoma, arises from the epithelium of transitional zone mucosa, which is derived from the cloacogenic membrane of the fetus (5). Fistulous cancer of the anus (Fig. 8) is a type of anal adenocarcinoma associated with a long-standing anal fistula track due to irritation of the epithelium caused by chronic inflammation. Among gastrointestinal leiomyosarcomas rectal origin is uncommon (less than 0.1 %), and anal leiomyosarcoma originating in the internal sphincter is extremely rare (Fig. 9)(6).

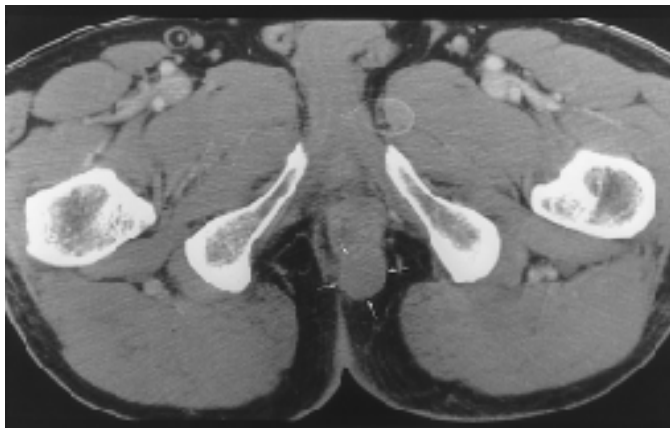
In the follow-up of patients with previous abdominoperineal resection of rectal adenocarcinoma, CT and MR imaging have become the modalities of choice. Images reveal a recurrent tumor appears as an irregular soft-tissue mass in the presacral space, perineum, or pelvic sidewall, with or without central necrosis (Fig. 10)(2).

Urachal carcinoma is an example of a pelvic tumor that can spread to the perineum via the round ligament (Fig. 11).

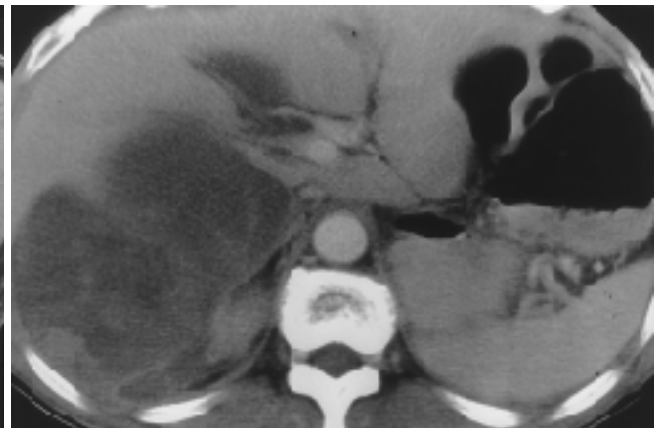
Urachal carcinoma is an example of a pelvic tumor that can spread to the perineum via the round ligament (Fig. 11).

### Congenital and Acquired Cystic Lesions

Tailgut cyst, or retrorectal cystic hamartoma, is an uncommon congenital lesion that typically occurs in the



A

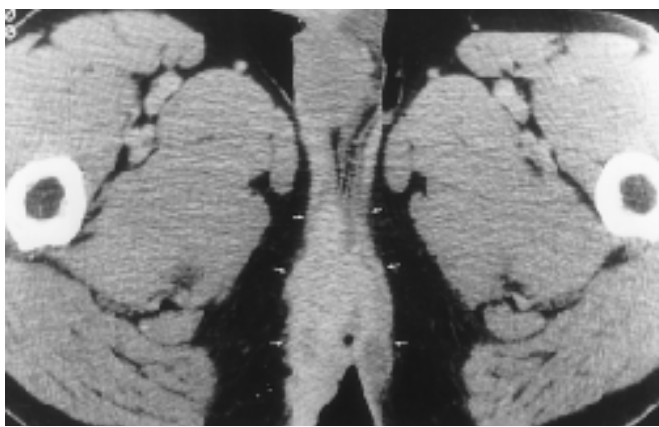


B

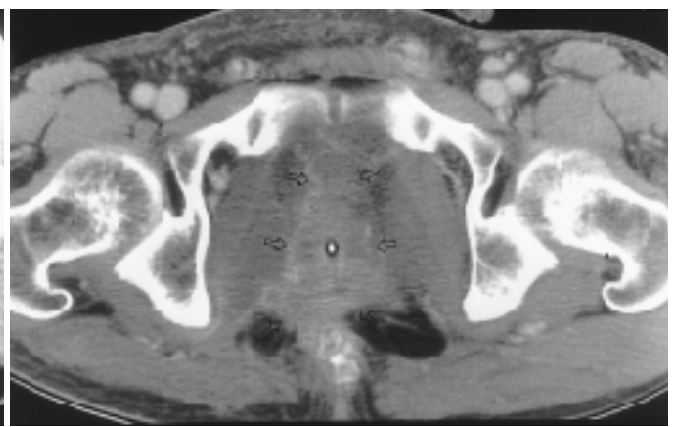
Fig. 9. Anal leiomyosarcoma in a 66-year-old male with a painful anal mass.

A. Initial contrast-enhanced CT scan shows a round soft tissue mass with peripheral mild enhancement (arrows) in the left perianal region, may be explained by central hemorrhagic necrosis.

B. CT scan at 8 months after abdominoperineal resection shows multiple liver metastases from anal leiomyosarcoma.



A



B

Fig. 10. Recurrent rectal cancers after Miles ' operation appear as an irregular soft tissue mass with involvement of the ischiorectal fossa (arrows in A), and diffuse infiltration along the perineum, presacral region and both pelvic side walls (arrows in B).

retrorectal space. On rare occasions, these cysts extend laterally from the presacral space to involve the perineum. Tailgut cyst is caused by incomplete regression of the embryonic tailgut. Malignant degeneration of the cyst rarely occurs (Fig. 12)(2).

Bartholins glands are located in the posterolateral aspect of the lower third of the vagina, and an inflammatory cyst develops as a result of infection of the underlying vestibular glands (Fig. 13)(3). Pelvic mucoceles rarely oc-

curred after colonic or rectal surgery undergone because of continuous secretion of mucus from the rectal stump. Pelvic lymphoceles are occurred following pelvic lymphadenectomy. Both mucocele and lymphocele manifest as a well-encapsulated mass with smooth regular walls and show low attenuation (Fig. 14, 15)(7). Uncommonly, a fistula linking the cyst with adjacent structures occurs in patients with secondary infection.

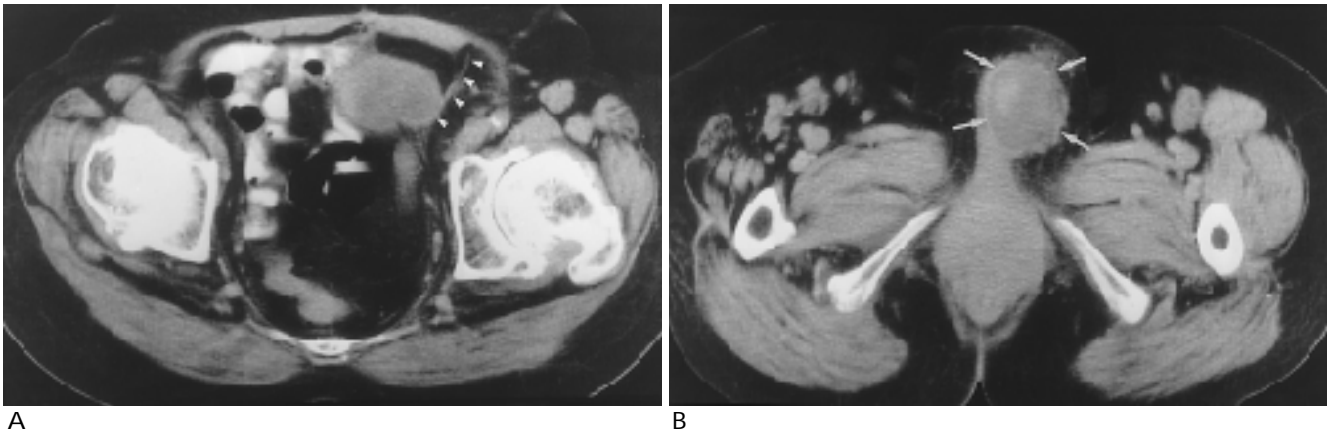


Fig. 11. Urachal adenocarcinoma spread to vulva through round ligament.

A. Contrast-enhanced CT scan through the pelvis shows a well-defined hypoattenuated mass and peripheral calcifications in the left prevesical space, adjacent to the round ligament (arrowheads), which was confirmed to a mucinous adenocarcinoma arising from the urachus.

B. Caudal CT scan through the vulva shows a hypoattenuated mass (arrows) in the left labium may be explained by the anatomical pathway of round ligament.

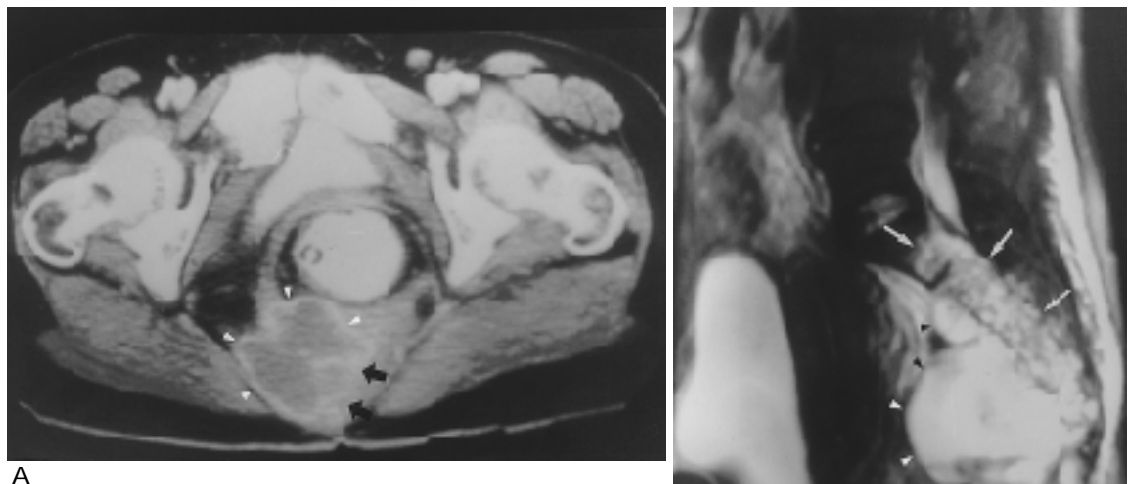


Fig. 12. Adenocarcinoma arising from the tailgut cyst in a 53-year-old female with tenesmus and buttock pain for several years.

A. Contrast-enhanced CT scan shows a well-defined, hypoattenuated mass involving the retrorectal space and the right ischiorectal fossa. It shows enhancement of the posteriorly located solid portion (arrows) representing carcinoma, and peripheral rim enhancement of the anteriorly located cystic portion (arrowheads).

B. Sagittal FSE T2 weighted (TR/TE, 3000/80) MR image shows a mass of high signal intensity in the retrorectal space (arrowheads) and irregular high signal intensities within the sacrum by tumor infiltration (arrows).

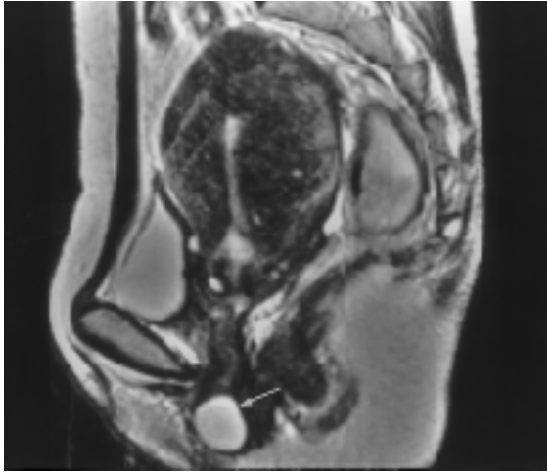


Fig. 13. Bartholin's duct cyst discovered incidentally in a 39-year-old female. Sagittal FSE T2 weighted (TR/TE, 4000/85) MR image shows a well defined, rounded mass with high signal intensity (arrows) in the labium.

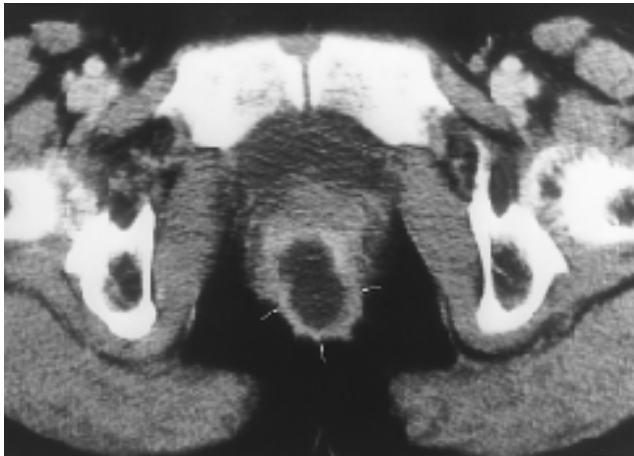


Fig. 14. Mucocele developed after Miles operation. Contrast-enhanced CT scan shows well-defined low-attenuation mass with peripheral high-attenuation due to calcifications and enhancement (arrows) in the perineum.

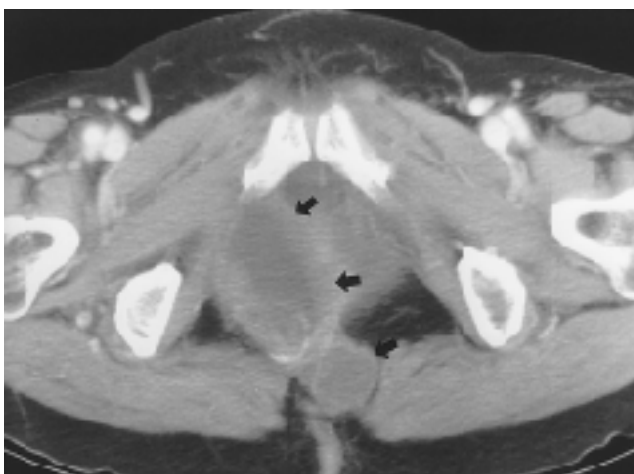


Fig. 15. Lymphocele developed after Miles operation. CT scan shows lobulated cystic mass (arrows) of perineum.

## Inflammatory Lesions

Fournier's gangrene is defined as a polymicrobial necrotizing fasciitis of the perineal, perirectal, or genital area. The causative factors are trauma to the perineal or scrotal region, urinary tract infection, and perianal infection. For as many as 40-60 % of patients, diabetes has been implicated as a complicating comorbid conditions. The characteristic CT appearance is soft tissue thickening

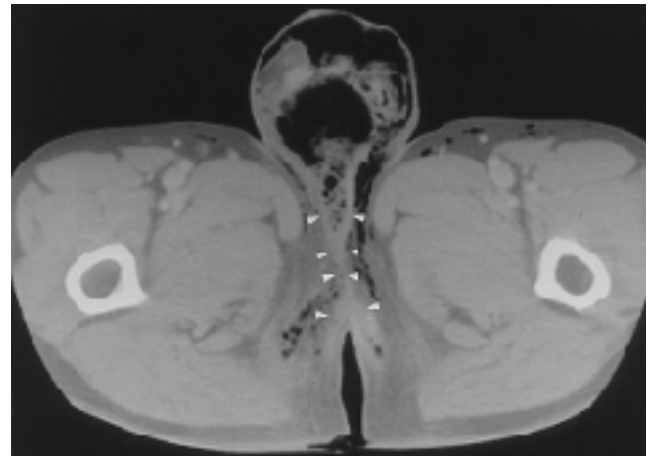


Fig. 16. Fournier's gangrene in a 65-year-old male with penile and scrotal swelling for 4 days. On physical examinations, perianal abscess and fistula were founded as a causative factor. Contrast enhanced CT scan shows extensive soft-tissue gas extending from the scrotum into the perineum along the insertions of ischiocavernosus and bulbocavernosus muscles (arrowheads), and into the pelvic and abdominal extraperitoneal spaces (not shown). Extensive soft tissue gas within the scrotum is noted, but testicles are commonly spared because of separate blood supply.



Fig. 17. Ischiorectal abscess in a 35-year-old female who had history of Bechet's disease admitted with anal discomfort. Contrast-enhanced CT scan shows a thick-walled infrlevator abscess collection of perianal region displacing the levator ani muscle medially (arrows).

ing, the stranding of fat surrounding the involved structures, and soft-tissue gas (Fig. 16)(8).

The perineum most often becomes infected as a result of a complicated perianal inflammatory disease. CT and MR imaging are useful for distinguishing between supralelevator and infralevator abscess. Supralelevator lesions displace the levator ani muscle laterally, whereas infralevator lesions displace it medially (2). Cases of Behcet's disease rarely involve the anal glands that arise at the level of the crypts of Morgagni (Fig. 17) (9).

#### References

1. Friedman AC, Radecki PD, Levi-Toaff AS, Hilpert PL. *Clinical*

*Pelvic Imaging*. Missouri: Mosby, 1990:16-23

2. Llauger J et al. The normal and pathologic ischiorectal fossa at CT and MR imaging. *Radiographics* 1998;18:61-82
3. Fletcher BD et al. Magnetic resonance imaging for diagnosis and follow-up of genitourinary, pelvic, and perineal rhabdomyosarcoma. *Urol Radiol* 1992; 14:263-272
4. Siegleman ES et al. Multicoil MR imaging of symptomatic female urethral and periurethral disease. *Radiographics* 1997; 17:349-365
5. Sink JD et al. Cloacogenic carcinoma. *Ann Surg* 1978; 188:53-59
6. Wang TK et al. anal leiomyosarcoma. *J Gastroenterol* 1998; 33:402-407
7. Davies RS. Pelvic mucocele after subtotal colectomy and rectal excision. *Clin Radiol* 1995; 50:499-500
8. Rajan DK et al. Radiology of Fournier's gangrene. *AJR* 1998; 170:163-168
9. Johnson WK. CT evaluation of the gastrointestinal tract in a patients with Behcet's syndrome. *AJR* 1994; 162:349-350

1999;41: 365-371

