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Radiology Report

A Newsletter from the Saint Vincent Hospital Department of Radiology

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Dr. David Bader: 2010 Physician of the Year



Radiology's own Dr. David Bader was selected as the winner of the Saint Vincent Hospital 2010 Physician of the Year Award. As acting Chief of Radiology, Dr. Bader was recognized for his outstanding leadership in developing the Radiology Department into a model of accessibility, responsibility, quality assurance, and efficiency.

He has led the department in developing many safety and quality measures, ranging from closely monitoring report turnaround times to patient satisfaction, as well as implementing systems to facilitate interactions and ease of communication, including the Radiology Physician Facilitator (who can be reached at 508-363-9380). Dr. Bader pioneered the "MD Notification" system, which last year tallied more than 10,000 physician interactions by the radiology physicians, demonstrating the integral and direct role that the Radiology Department plays in patient care. His nomination noted that he is a "genuine and good-natured human being who acts out of earnestness, always putting patients first." We would like to extend our sincerest congratulations to Dr. Bader on this well-deserved award.



David A. Bader, MD,
Acting Chief of Radiology

Saint Vincent Hospital: 100 Top Hospitals® Award Winner

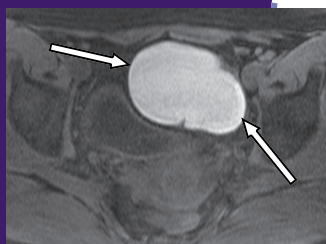
We are proud to announce that Saint Vincent Hospital was recently honored as one of the 100 Top Hospitals for 2011, selected by Thomson Reuters out of 3,000 hospitals nationwide, and the only hospital in Worcester County to receive this award! In other words, our hospital was ranked among the top 3% of hospitals across the nation.

This award is truly a landmark achievement for our hospital, and reflects the passion, dedication, and tireless hard work of our entire hospital staff. In order to receive this

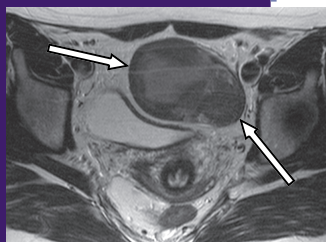
mark of distinction, Saint Vincent Hospital was recognized not only as a provider of top-notch medical care, but also as a healthcare organization dedicated to continual self-evaluation and improvement. As a Top 100 Hospital award winner, Saint Vincent Hospital is among the best in the nation at delivering high-quality patient care, and provides an example for other hospitals to follow across the country.



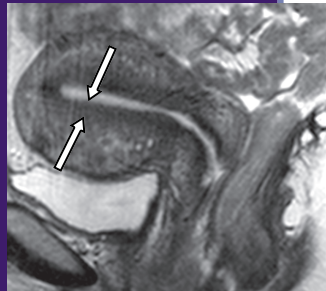
MRI of the Female Pelvis



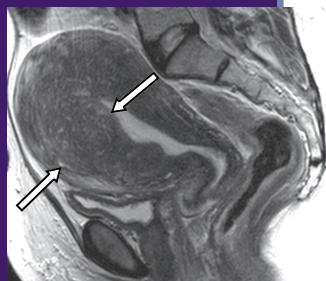
Axial T1-weighted fat saturated MR image showing a "light-bulb" bright left ovarian mass (arrows).



Axial T2-weighted MR image showing that the mass above becomes T2 dark, a phenomenon described as "shading" (arrows). Together, these findings are 98% specific for endometrioma.



Sagittal T2-weighted MR image showing a normal uterus, including a normal, thin junctional zone (between arrows).



Sagittal T2-weighted MR image of a different patient showing a markedly-thickened junctional zone (between arrows) caused by ectopic endometrial glands embedded in the myometrium, diagnostic of adenomyosis.

Ultrasound is generally the initial imaging modality of choice for evaluation of pathology in the female pelvis, especially given that ultrasound is widely available and relatively inexpensive. However, pelvic ultrasound has its limitations, including a limited imaging field of view, frequent obscuration of pelvic organs by overlying bowel gas, and limitations dependent on patient body habitus. Also, ultrasound is extremely operator dependent. When an ultrasound is inconclusive, MRI will often provide a more definitive answer. MRI has excellent tissue characterization and unlike ultrasound, MRI can differentiate fatty from hemorrhagic masses, and can more specifically characterize complex cystic lesions as benign or malignant.

Please see the upper right table for a list of appropriate indications for obtaining an MRI of the female pelvis, as well as the discussion below of select indications.

OVARIAN NEOPLASMS

MRI can more specifically characterize ovarian lesions deemed as indeterminate on ultrasound, and can therefore decrease the number of unnecessary benign resections [1]. Not only can MRI characterize the tissue content of a sonographically-indeterminate adnexal mass, but it is also highly accurate in identifying the organ of origin (i.e., ovary versus uterus) [2]. MRI is typically indicated when ultrasound finds an indeterminate solid or mixed solid and cystic adnexal mass. In fact, using the intravenous contrast media gadolinium, MRI can differentiate benign nonenhancing clot from enhancing tumor, and MRI has higher specificity compared to ultrasound in identifying malignant lesions. MRI can also definitively diagnose many benign ovarian tumors, particularly dermoid cysts and ovarian fibromas. For example, MRI is excellent at identifying intratumoral fat characteristic of ovarian dermoids, with a specificity of 99% [3].

ENDOMETRIOSIS

The endometrium is the inner lining of the uterus. Endometriosis refers to functional ectopic endometrial glands and stroma located outside of the uterine cavity. The ovary is the most commonly involved site, where these cystic lesions are known as endometriomas or "chocolate cysts" [1]. Symptoms include pelvic pain and infertility, and there is an overall prevalence among women of 5-10% [4]. MRI is the best imaging modality for both the detection and characterization of endometriosis. In fact, MRI demonstrates a sensitivity of 90%, a specificity of 98%, and an overall accuracy of 96% for the diagnosis of endometriosis [5]. MRI can even detect endometriotic implants smaller than 5 mm.

HYDROSALPINX

Hydrosalpinx is the condition of a fluid-filled fallopian tube, and it is often readily diagnosed on ultrasound. However, on ultrasound hydrosalpinx can occasionally be confused with a complex cystic ovarian neoplasm, and MRI can be helpful in differentiating between these two diagnostic considerations. Moreover, MRI can be useful in identifying whether complex fluid in the dilated tube corresponds to hemorrhage (hematosalpinx) or pus (pyosalpinx), the latter as can be seen in the setting of pelvic inflammatory disease (PID) [6].

Indications for MRI Female Pelvis

Adnexa

- Complex cystic lesions
- Endometriosis
- Ovarian neoplasms
- Hydrosalpinx

Uterus

- Adenomyosis
- Fibroids
- Müllerian duct anomalies
- Staging of known cervical cancer
- Staging of known endometrial cancer

Urethral & Periurethral Disease

- Urethral diverticula
- Periurethral cysts

Pregnant Patients

- Acute appendicitis
- Placenta creta

ADENOMYOSIS

Adenomyosis is a common disorder that most commonly affects premenopausal women, and which occurs when ectopic endometrial glands extend into the myometrium (muscular layer) of the uterus. The symptoms include pelvic pain, menorrhagia (excessive menstrual bleeding), and dysmenorrhea (painful menstruation). Although often difficult to diagnose this disorder on ultrasound, MRI is highly accurate and much more specific at diagnosing adenomyosis [7].

DEVELOPMENTAL ANOMALIES

Müllerian duct anomalies are developmental anomalies that lead to incomplete or abnormal formation of the uterus, fallopian tubes and vagina. These anatomic anomalies are important because they can lead to increased rates of spontaneous abortion or premature delivery. MRI is much more specific than both ultrasound and hysterosalpingography in characterizing these anomalies and is the imaging study of choice.

URETHRAL DIVERTICULA

MRI is actually more sensitive than urethrography or fiberoptic urethroscopy in the diagnosis of urethral diverticula, and can also identify malignancy within a diverticulum [8]. MRI is therefore indicated when there is clinical suspicion of a diverticulum, but other imaging studies have been inconclusive.

Daniel J. Kowal, MD

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Iodinated IV Contrast Media: FAQs

Recommendations for Patients with Multiple Myeloma

It was once thought that multiple myeloma, a cancer of the plasma cells in bone marrow, was a significant risk factor for developing renal failure after receiving iodinated IV contrast media for Computed Tomography (CT) scans, and intravenous contrast was typically avoided in these patients. However, studies have shown that modern day IV contrast agents, while not completely risk free, have an incidence of contrast nephropathy in myeloma patients of only 0.6-1.25% compared to the risk of 0.15% in the general public [1].

Therefore, patients with multiple myeloma **may** receive iodinated IV contrast prior to CT scan if they are adequately hydrated and are not significantly hypercalcemic. Recent creatinine and calcium levels should be reviewed prior to administering contrast. In addition, the American College of Radiology suggests oral or IV hydration for **6-12 hours** prior to receiving contrast, and also for at least **4-12 hours** after [2].

The risk of renal failure has been shown not to be related to myeloma itself, but rather to the presence of associated dehydration, hypercalcemia, infection and Bence-Jones proteinuria. Specifically, hypercalcemic patients experience emesis and nephrogenic diabetes insipidus, both causing dehydration and urinary cast formation. These patients also suffer from direct toxic effects of elevated calcium, including nephrocalcinosis. Infection can also cause dehydration and may lead to the use of nephrotoxic antibiotics. Bence-Jones proteins, which are proteins found in the urine of multiple myeloma patients, lead to precipitation of protein casts in dehydrated patients causing acute renal failure. Bence-Jones proteinuria can also have a more chronic toxic effect on renal tubular cells. Older ionic contrast agents were noted to form precipitates with Bence-Jones proteins *in vivo*, but this phenomenon has not been seen with modern nonionic contrast agents such as those used at Saint Vincent Hospital. Moreover, the above conditions are all risk factors for acute renal failure in multiple myeloma patients that exist even without intravenous contrast administration.

Daniel J. Kowal, MD

Meet Dr. Michael Meyerovitz

We are pleased to introduce our Director of Interventional Radiology, Dr. Michael Meyerovitz. He joined the Department of Radiology at Saint Vincent Hospital in 2001, maintaining an active interest in Interventional Radiology with particular interest in arterial interventions. Born in Johannesburg, South Africa, Dr. Meyerovitz went to medical school at the University of the Witwatersrand. After Radiology residency at St. Thomas' Hospital in London, England and St. Louis University in Missouri, he completed a two-year NIH-sponsored fellowship in Cardiovascular and Interventional Radiology at the Brigham and Women's Hospital in Boston. He stayed on staff as an attending in Cardiovascular and Interventional Radiology at the Brigham where he became an Associate Professor of Radiology at Harvard Medical School, Director of Vascular and Interventional Radiology, and Director of the IR Fellowship Training Program.

He has published 57 articles in peer reviewed journals, written 11 book chapters, and given over 100 presentations around the world in Vascular and Interventional Radiology. He is Board Certified in Radiology with Certificate of Added Qualification in Vascular and Interventional Radiology, has served as an Examiner for the American Board of Radiology, and has been listed in Best Doctors in America since 1996.



CT scan with intravenous contrast showing a large mass (arrows) invading the right rib and thoracic spine in this patient with multiple myeloma.

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QUESTIONS, COMMENTS?

The goal of *Radiology Report* is to provide our medical community with up-to-date information regarding radiology examinations and procedures, including the latest imaging protocols available in our department. If you have a question or comment about a particular article in this issue, please feel free to contact any of our authors for further discussion. Also, if there are topics in radiology that you would like to see discussed in a future issue of *Radiology Report*, please email the editors at:

radiology.report@stvincenthospital.com

**Physician Radiology Access #
508-363-9380**

Magnetic Resonance Arthrography at Saint Vincent Hospital

Magnetic Resonance (MR) Arthrography is a diagnostic imaging technology of significant clinical utility in the evaluation of joint pathology particularly related to sports injuries and in patients who have had prior intra-articular surgery. MR Arthrography is more sensitive than conventional MRI, and it is generally preferred in young patients, athletes, and for confirmation and better evaluation of lesions seen on conventional MRI.

Arthrography first involves injection of the joint with a contrast agent. At Saint Vincent Hospital, we do this injection under fluoroscopic guidance. The joint is distended with a fluid mixture of lidocaine (to help minimize the discomfort of joint distension), Isovue (the contrast agent used to fluoroscopically confirm intra-articular position of needle and presence of the mixture in the joint), gadolinium (the contrast agent for MRI), and sterile saline. Sterile technique is used to inject this mixture after local anesthetic is administered. Following the injection, the patient immediately proceeds to the MRI suite, and MR arthrographic imaging is then performed. If the patient has a permanent pacemaker or other contraindication to MRI, CT arthrography may be performed as an alternative.

We offer MR Arthrography of all joints, and it is useful in the evaluation of:

SHOULDER: Rotator cuff pathology, labral and ligamentous lesions, cartilaginous lesions, and loose body detection

ELBOW: Collateral ligament tears, osteochondral or chondral lesions, and loose body detection

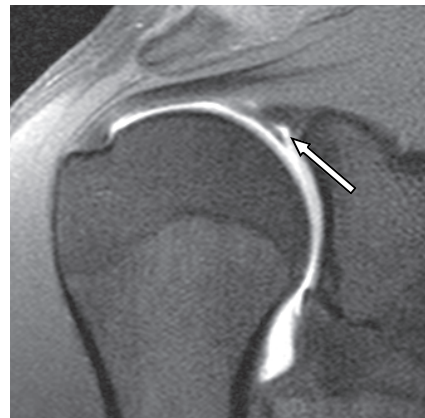
WRIST: Ligament tears, particularly the triangular fibrocartilage complex, and intercarpal (scapholunate and lunotriquetral) ligaments and cartilage lesions

THUMB: Ulnar collateral ligament tears and Stener lesions

HIP: Femoroacetabular impingement syndrome, labral tears, and evaluation of chondral lesions

KNEE: Particularly useful in the postoperative knee in post-meniscectomy patients

ANKLE: Chondral lesions



MR arthrogram coronal image of the shoulder showing bright injected gadolinium entering a tear of the superior labrum (arrow). The labrum is the cartilage ring that surrounds the shoulder socket.



Axial image again showing this superior labral tear, specifically a SLAP tear (arrows). A SLAP tear occurs at the point where the tendon of the biceps muscle inserts onto the labrum.