

# Penile Arterial Blood Supply: Gadolinium-enhanced, Dynamic 3D-Liver Acquisition with Volume Acceleration (LAVA) MR Evaluation at 3T with 8-channel Phased Array (PA) Coil Prior to Radical Retropubic Prostatectomy

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**Purpose:** We evaluated the feasibility of visualizing blood supply from internal and accessory pudendal arteries to the penis prior to radical prostatectomy using gadolinium-enhanced, dynamic 3D-fast SPGR MR pulse sequences at 3T and phased array surface coil.

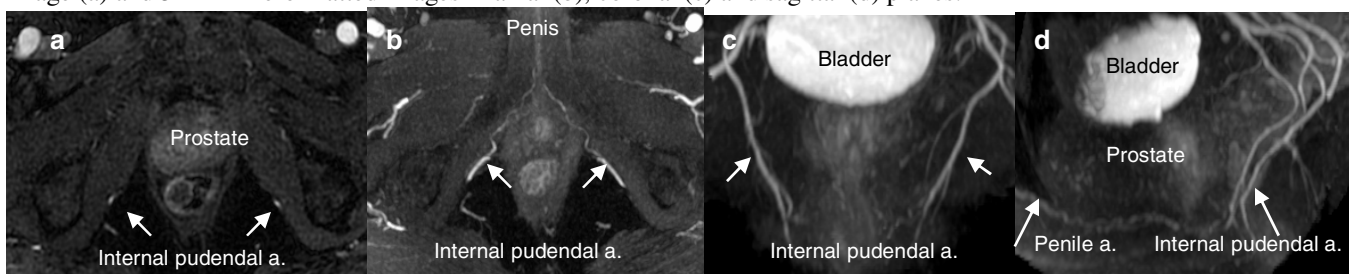
**Introduction:** Nerve-sparing radical retropubic prostatectomy is currently common treatment for patients with organ-confined prostate cancer. Erectile dysfunction may be a sequel despite successful nerve-sparing procedures. In a study of penile arteries in 20 cadavers, Droupy et al. reported 3 patterns including Type I) arising exclusively from accessory pudendal arteries (3/20), Type II) arising from both internal and accessory pudendal arteries (14/20), and Type III) arising only from internal pudendal arteries (3/20). Accessory or aberrant pudendal arteries are located immediately anterior to the prostate in the retropubic region above the levator ani muscles while the internal pudendal arteries are located classically below the levator ani muscles. Because the accessory pudendal arteries are located very close to the prostate, the risk of injury, which is potential for arteriogenic impotence, is high during radical prostatectomy. Therefore, preoperative knowledge of the presence of accessory pudendal arteries could minimize inadvertent injury at radical prostatectomy. To the best of our knowledge, there has been no report in the literature to study whether MRI can visualize the penile blood supply from internal and accessory pudendal arteries.

**Material and methods:** 3T MRI (Signa HD, GE Healthcare, Waukesha, WI) was performed with an 8-channel, torso-phased array coil (GE Healthcare, Waukesha, WI) for the evaluation of 5 patients with clinically localized prostate cancer prior to radical prostatectomy. All patients were imaged with a 3D-fast SPGR MR pulse sequence designed for dynamic liver imaging (Liver Acquisition with Volume Acceleration, LAVA) following IV administration of gadodiamide (Omniscan, GE Healthcare, Waukesha, WI). The MR images were reviewed by one radiologist to assess the presence of internal and accessory pudendal arteries. All patients underwent nerve-sparing radical retropubic prostatectomy by one urologist. The MR findings were correlated with surgical findings.

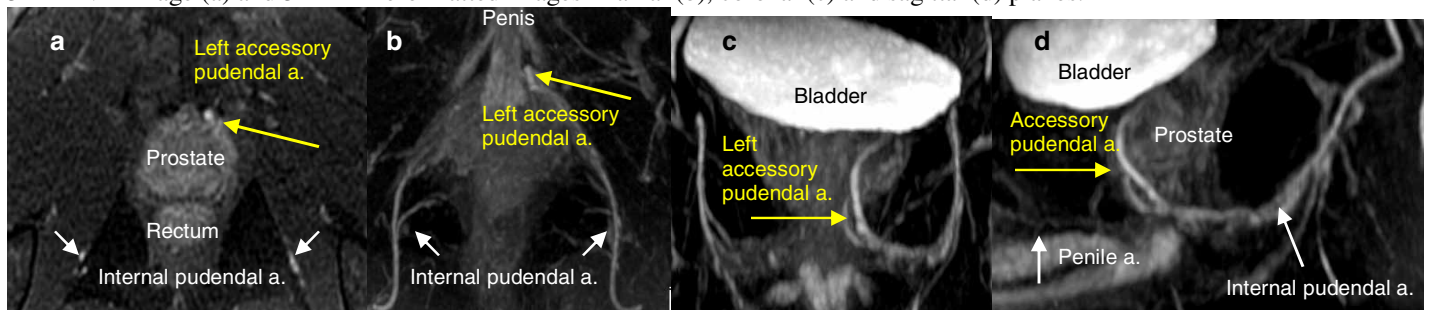
**Results:** 3D-LAVA images demonstrated Droupy's Type III penile artery arising from internal pudendal arteries in 4 of the 5 patients (Fig 1); no accessory pudendal artery was present at surgery in these patients. One remaining patient had Droupy's Type II with penile arteries arising from both internal and accessory pudendal arteries on MR images (Fig 2); the presence of an accessory pudendal artery was confirmed and spared at surgery.

**Conclusion:** 3D-LAVA imaging at 3T with an 8-channel phased array surface coil can visualize accessory pudendal arteries. Further study in a larger number of patients and with a long term clinical follow-up will be necessary to assess the prevalence of each of Droupy's patterns of penile arterial blood supply from internal and accessory pudendal arteries on MR imaging and to predict outcome in terms of arteriogenic erectile dysfunction after nerve-sparing radical retropubic prostatectomy combined with preserving the accessory pudendal arteries.

**Fig 1a-d:** Penile artery from internal pudendal arteries (Droupy's Type III) as shown on axial gadolinium-enhanced 3D-LAVA source image (a) and 3D MIP reformatted images in axial (b), coronal (c) and sagittal (d) planes.



**Fig 2a-d:** Penile artery from both accessory and internal pudendal arteries (Droupy's Type II) as shown on axial gadolinium enhanced 3D-LAVA image (a) and 3D MIP reformatted images in axial (b), coronal (c) and sagittal (d) planes.



**References:** Droupy S, Benoît G, Giuliano F, Jardin A. Penile arteries in humans: origin-distribution-variations. *Surg Radiol Anat* 19:161-7,1997.