

## Hemospermia: MR Imaging with an Endorectal Surface Coil

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= 국문초록 =

### 혈정액증환자에서의 경직장 코일을 이용한 자기공명 촬영

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혈정액증 환자 17명에서 경직장 초음파검사와 직장코일을 이용한 자기공명영상검사를 시행하여 전립선과 정로계에서의 원인을 분석하였다. 대상환자의 평균 연령은 44세(20-59세)였고, 평균 병력기간은 32개월(1주일-16년)이었다. 경직장 초음파검사에서는 88%(15/17)에서 이상소견이 발견되었으나 자기공명영상검사에서는 모든 환자에서 이상소견이 발견되었다. 이상소견으로는 낭종 11례(뿔러관 낭종 7례, 사정관 낭종 4례), 결석 19례(전립선 결석 5례, 정낭 결석 8례, 사정관 낭종 결석 4례, 뿔러관 낭종대 결석 2례), 혈종 12례(정낭내 혈종 10례, 사정관 낭종내 혈종 2례), 그의 정낭 위축과 전립선 위축 및 볼프관 기형 각 1례 가 발견되었다.

직장코일을 이용한 자기공명영상술 시행함으로써 경직장 초음파검사에 비해 연부조직간의 뚜렷한 대조로서 전립선과 정로계통의 해부학적 구조를 명확히 관찰할 수 있고, 사정관과 정관 팽대부 및 정구의 구조를 명확하게 영상화할 수 있을 뿐 아니라 정로계통의 측면, 시상면, 관상면 등 다차원적 영상화가 가능하고, 체부 혹은 골반 코일을 병용함으로써 광범위 내부구조의 영상을 객관적으로 얻을 수 있었다.

이상에서 혈정액증 환자에서의 자기공명영상술은 정로의 병병을 밝히는 데에 우수하였으며, 경직장 초음파술에서 만족스러운 결과를 얻지 못할 때에 유용한 검사로 사료된다.

**Key Words:** Hemospermia, MR Imaging, Endorectal Surface Coil.

### INTRODUCTION

Hemospermia is not an uncommonly encountered clinical entity in urologic practice, and poses a diagnostic and treatment challenge, associated with various genital and seminal tract abnormalities, including primary malignancies<sup>1)</sup>, vascular deformities<sup>2)</sup>, tuberculosis<sup>1)</sup>, and congenital anomalies<sup>3)</sup>. It is often over-

looked because the symptom is usually intermittent and self-limited<sup>4)</sup>. Traditional methods of reassurance and empirical prescription of diethylstilbesterol have been widely practiced but both patient and physician could not be certain of the condition. In the past, vasovesiculography<sup>5)</sup> has been extensively used to visualize the seminal tract, and recently the transrectal sonography has replaced the vasography as a premier noninvasive mo-

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**Table 1.** Abnormal findings in 17 hemospermia patients with MR Imaging

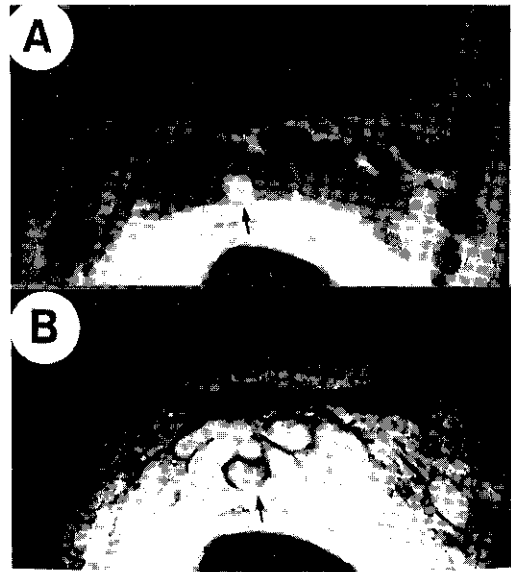
Abnormal Findings	Total No
Cystic abnormality	11
Müllerian duct cyst	7
Wolffian duct cyst	4
Calculi	19
Prostate	5
Seminal Vesicle	8
Ejaculatory duct cyst	4
Müllerian duct cyst	2
Hemorrhage	12
Seminal vesicle	10
Ejaculatory duct & Vas	2
Others	3
Atrophy of seminal vesicle	1
Atrophy of prostate	1
Ectopic ureterocele	1

ality<sup>6)</sup>. More and more imaging plays an important role in the detection of anatomic lesions in such patients. However, its suboptimal soft-tissue contrast and spatial resolution are obstacles for complete evaluation of the minute structures of the seminal tract. Images obtained on ultrasonography are subject to observer variation. It has been shown that the resolution of prostatic and seminal vesicular anatomy on MR is improved with the addition of the endorectal surface coil<sup>7)</sup>. It is demonstrated that MR imaging using endorectal surface coil is a valuable method to evaluate the patient with ejaculatory dysfunction including the infertility, hemospermia, and painful ejaculation<sup>8)</sup>.

## SUBJECTS AND METHODS

To evaluate prostate and seminal tract in 17 hemospermia patients, MR imagings using endorectal surface coil were performed. Mean age of patients was 44 (20-59), and mean duration of infliction was 32 months (1 wk-16 years).

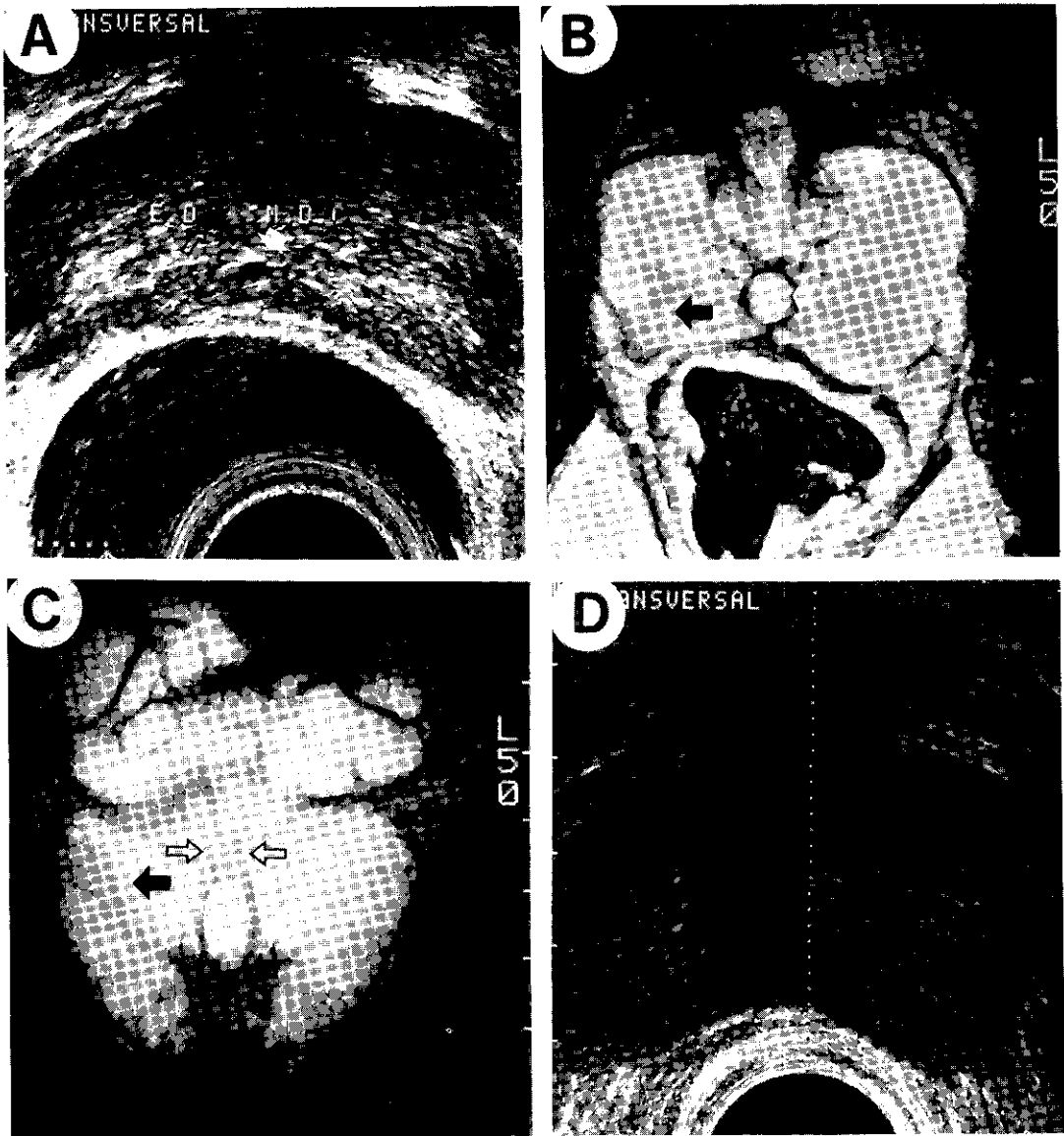
MR imaging was performed with a 1.5-T unit (Signa: GE Medical Systems, Milwaukee, WI), and images were obtained with an en-



**Fig. 1.** Right seminal vesicle hemorrhage in 52 year old male with chronic history of hemospermia. **A** (axial T1WI), **B** (axial T2WI). A round, cystic mass (arrow) is seen slightly right to the midline of seminal vesicle, which is seen as high signal on T1-weighted image and slightly lower signal on T2WI.

dorectal surfaced coils (Medrad, Pittsburg, PA). The endorectal coil was inflated with approximately 50-80ml of air. Any bowel preparation or medical subscription was not used. An initial sagittal series of localizer T1-weighted images was obtained. Fast spin echo (FSE) T2-weighted images were acquired in the transaxial plane. Field of view (FOV) was 10 to 12 cm with 258×258 matrix, and section thickness was 3 to 5 mm. Finally T1-weighted axial images were obtained. Seminal vesiculography were used to confirm the ejaculatory ducts and cysts when contrast media opacified the cysts detected on MR imaging.

Prostaic cysts were classified into Mullerian duct origin when they are located in the center, and the ejaculatory ducts are visualized on sides of the cysts. ejaculatory duct cysts were defined when they were located peripherally or when upper portion of the cyst was deviated to either side, and ejaculatory ducts were not visualized with the cysts or connected to the cysts. Calculi were determined

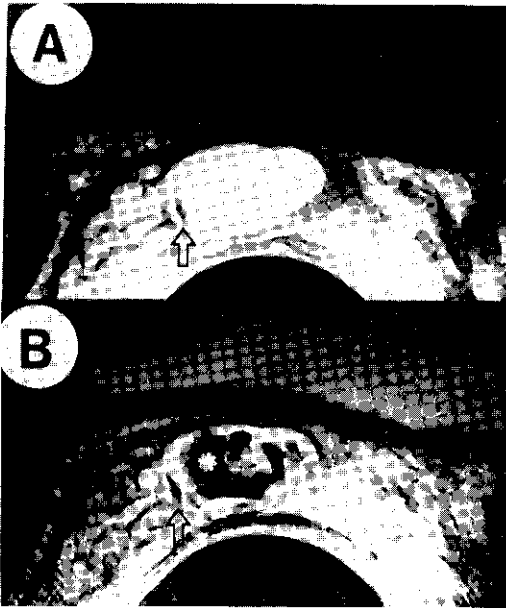


**Fig. 2.** Müllerian duct cyst (M.D.C.) and prostatic atrophy. **A.** 4mm-sized, round, hypoechoic cyst (white arrow) is seen at the midline of prostate and right ejaculatory duct (E.D., empty arrow) is also seen. **B** (axial T2WI), **C** (coronal T2WI). Centrally located cyst is as with high signal intensity on T2-weighted view, and showing as a typical tear-drop shaped cyst (white arrow). Both sides of seminal vesicles show markedly dilated. Ejaculatory ducts are faintly but clearly visualized (empty arrow). Focal prostatic atrophy is seen as low intensity area (bold arrow). **D.** Post-TUR ultrasonography. Cyst and ejaculatory ducts are not seen, and patient no longer complained of hemospermia.

when discrete signal void nodular structures were seen on either T2- or T1-weighted images. Hemorrhage was also determined when strong bright signal intensity on T1 was seen.

## RESULTS

Abnormalities was found in 88% (15/17) with transrectal ultrasonography, and on MR imaging all cases revealed some abnormalities (Table 1). The abnormalities found were 12 hemorrhages (10 seminal vesicle hemorrhage



**Fig. 3.** Ejaculatory duct cyst with calculi and right seminal vesicle hemorrhage in 28 year old patient. **A** (axial T1WI), **B** (axial T2WI). Centrally located ejaculatory duct cyst is seen with high signal intensity on both T1 and T2 weighted image due to intracystic hemorrhage. Multiple signal void patterns by hemorrhage (asterisk) are clearly depicted in cystic lumen. Intracystic calculi (empty arrow) is seen with low signal intensity on both T1WI and T2WI. Strong high signal intensity on T1WI and slightly decreased intensity on T2WI on right side of seminal vesicles also suggests intravesicular hemorrhage.

(Fig. 1,3,4), 2 ejaculatory duct hemorrhage (Fig. 4)), 11 cystic lesion (7 Müllerian duct cysts (Fig. 2,4), 4 ejaculatory duct cysts (Fig. 3,4)), 19 calculi (5 in prostate, 8 in seminal vesicle (Fig. 4), 4 in ejaculatory duct cyst (Fig. 3,4), and 2 in Müllerian duct cyst), 1 atrophy of seminal vesicle, 1 atrophy of prostate (Fig. 2), and one case (Fig. 5) of Wolffian duct anomaly associated with ejaculatory duct cyst, ectopic ureterocele and absence of left kidney.

## DISCUSSION

Hemospermia when present merits a formal evaluation. Routine genitourinary tract evaluation of IVP and cystoscopy is usually insufficient thus transrectal ultrasonography is

employed initially.<sup>5)</sup> However its limitations in the spatial resolution and soft-tissue contrast may not permit complete evaluation of the ejaculatory ducts and seminal vesicles. In our series not all patients revealed abnormalities (88%) in TRUS, furthermore its findings were not conclusive as the findings confirmed with MRI to formulate a suitable treatment plan.

MR imaging with endorectal coil has many advantages. First, the soft tissue contrast is superb and the detailed anatomical evaluations of prostate and seminal tract are possible.

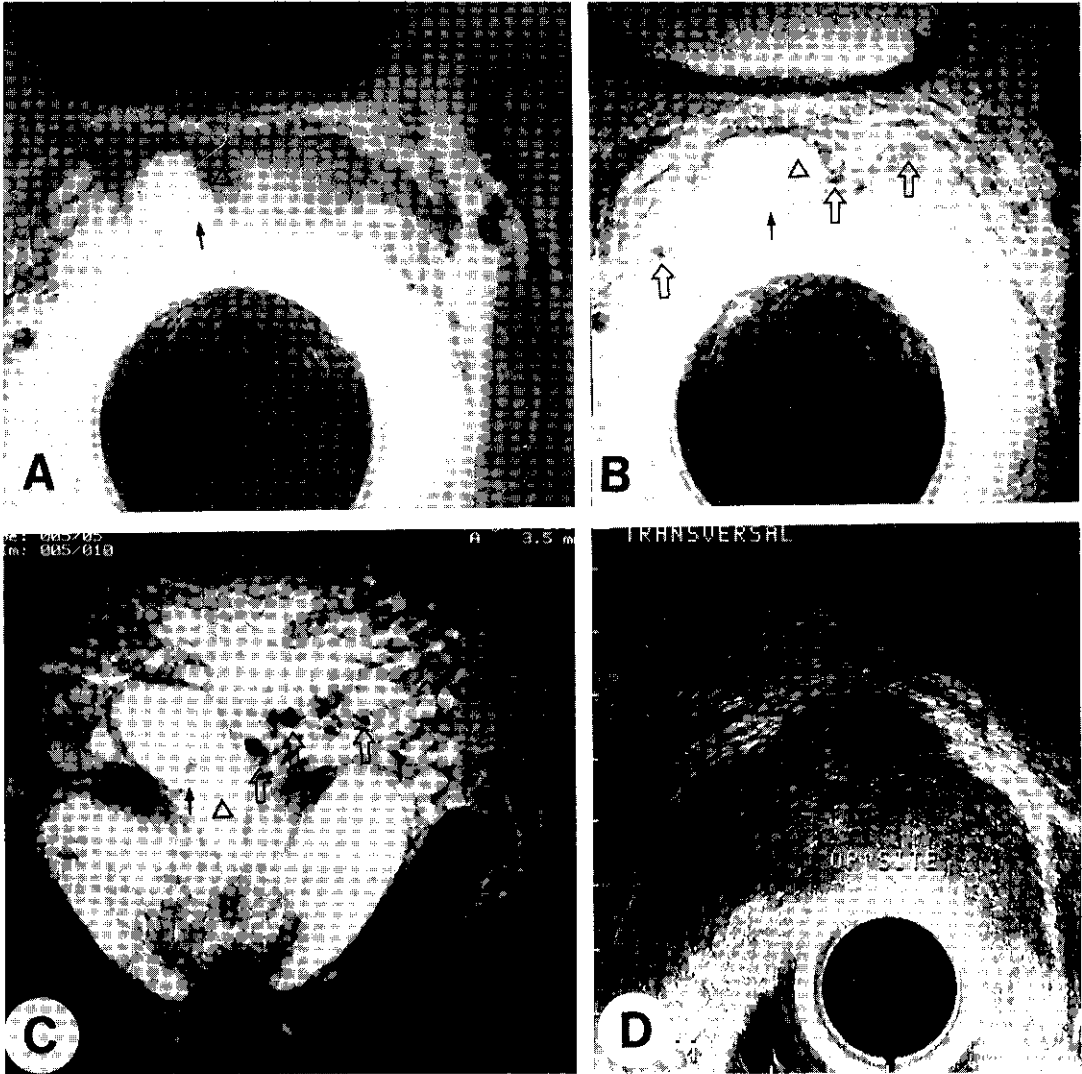
Ejaculatory duct, ampulla of vas, verumontanum, and internal structural organization of prostate can be elucidated noninvasively.<sup>6)</sup> The multiaxial imaging is possible, and this is valuable when considering the axis of seminal tract usually not located in perpendicular biplanar axis. Simultaneous evaluation of other part of body can be performed by switching to body surface coil with wide field of view (FOV). The transurethral ultrasonography is largely operator-dependent, but MRI is much subjective. Lastly, when compared to vasography, MRI is noninvasive and free from radiation hazard. However, the main limitation of widespread use of MRI is the availability of endorectal coil, and high current cost especially compared to TRUS. Presently we have set up a guideline limiting MRI to the cases of normal or equivocal findings found in TRUS. Vasography is performed only as preoperative evaluation just before surgical exploration for correction.

We have utilized the transurethral unroofing or incision of cystic lesions located near prostatic urethra, such as Müllerian duct cysts or large ejaculatory duct cysts. After the first report of hemospermia caused by Müllerian duct cyst<sup>9)</sup>, procedures such as transtrigonal excision<sup>10)</sup> or laparoscopic excisions<sup>11)</sup> are reported for large-sized cysts. Cysts are congenital in origin and the reason that symptoms do not occur earlier in life is probably the enlargement of seminal tract and prostate occurs

after puberty and only after the patient is able to ejaculate the symptom can be revealed. In preadolescent age, utricule cysts (Müllerian ducts) present with lower obstructive symptoms or epididymitis<sup>12</sup>. High incidence of unilateral agenesis is reported as seen in case 5<sup>12</sup>.

The second peak age group of our patients

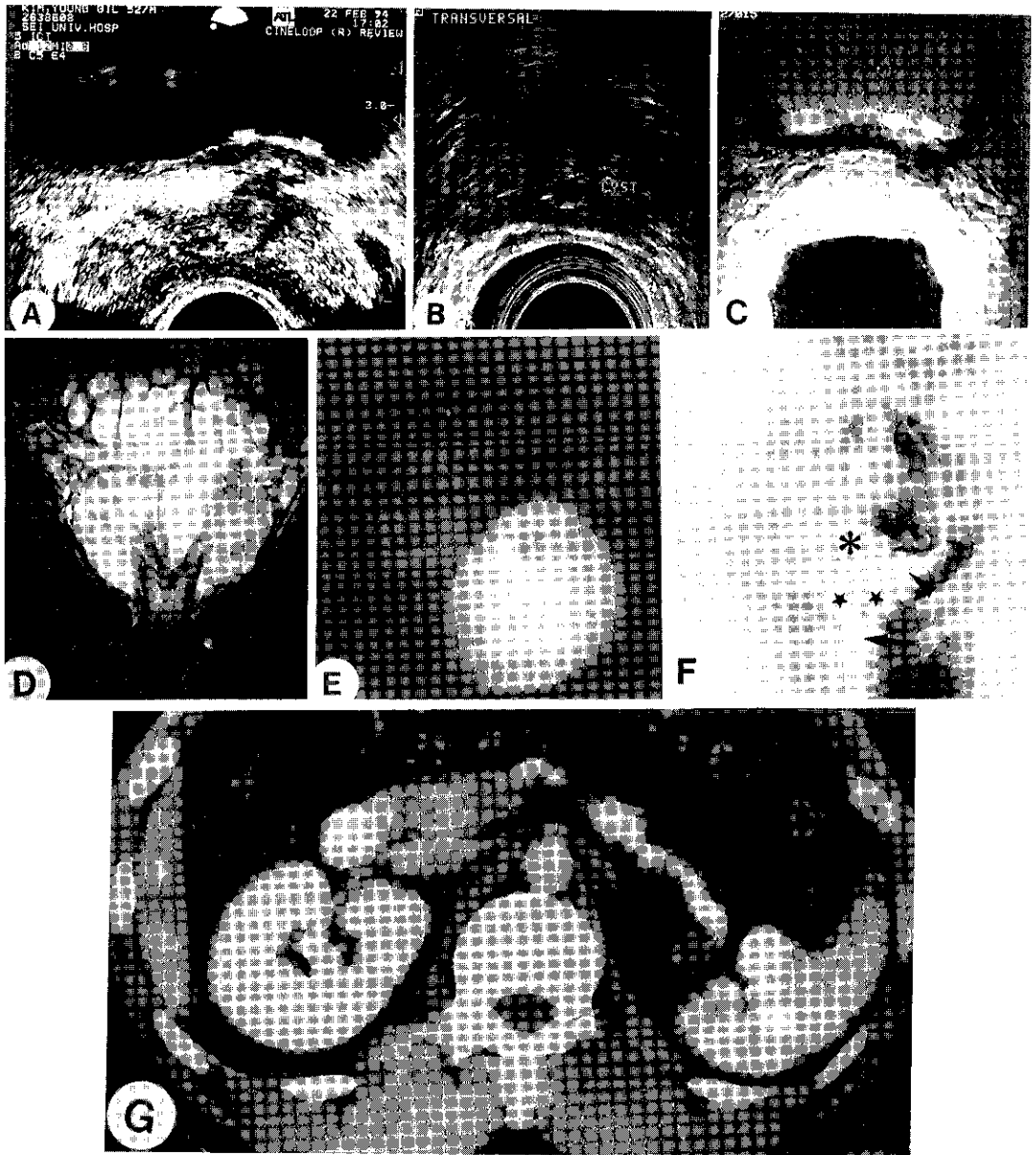
are in the middle aged men, which can be explained to the aggravation of obstruction due the enlargement of prostate such as in benign prostatic hyperplasia, making more susceptible to the obstruction and effective than the traditional empirical use of hormones such as estrogen. At first the damages to ejaculatory



**Fig. 4.** Müllerian duct cyst, right ejaculatory duct cyst with hemorrhage and calculi, right seminal vesicle with hemorrhage, and bilateral seminal vesicles with calculi in 51 year old male. **A** (axial T1WI), **B** (axial T2WI), **C** (coronal T2WI). Typical, well margined, tear-drop shaped Müllerian duct cyst (triangle) is seen the midline of the proximal prostate with low signal intensity on T1WI and increased signal on T2WI. Beside of Müllerian duct cyst, the right ejaculatory duct cyst was located, which includes of calculi (small arrow) and is seen with high signal intensity on both T1 and T2 weighted image due to intracystic hemorrhage. Right seminal vesicle is dilated with increased signal intensity on T1WI is suggestive of hemorrhage. Multiple calculi (empty arrows) on both seminal vesicles are seen as signal void areas. **D.** Post-transurethral unroofing view of prostate. Operative site is seen as hypochoic area.

ducts, external urethral sphincter, and rectum were of great concern. Previous report on endoscopic incision revealed that many cases re-

curred and all the treatments required vasography with dye injection to confirm the cysts<sup>5</sup>. However the judicial use of incision with cold



**Fig. 5.** Wolffian duct anomaly associated with ejaculatory duct cyst, ectopic ureter, and unilateral renal agenesis in 52 year old patient. **A.** Transrectal ultrasound reveals unusually hypoechoic left ectopic ureteroceles (white arrows), which continues the seminal vesicle (dark arrow). **B.** Another view shows hypoechoic midline cyst. **C.** On axial T2-weighted image, a deficted fistulous tract (dark arrow) is found from ectopic ureteroceles (white arrows) to the left seminal vesicle. **D.** Coronal T2WI shows eccentrically located ejaculatory duct cyst and markedly dilated seminal vesicles. **E.** Endoscopy shows a verumontanum as an enlarged cystic structure. **F.** Left seminal vesiculography opacified the seminal vesicles (asterisk and stars) which connected vas deference (empty arrow), ejaculatory duct cyst (large arrow) and ectopic ureteroceles (arrow head) which joins with ureter. **G.** Computed tomography at the level of the kidney demonstrates the absence of the left kidney.

knife and incising roof of commonly used in during transurethral resection of prostate is sufficient. Intraoperative ultrasonographic monitoring of prostate and seminal structures either by transurethral or transrectal probe is mandatory. With longest follow-up of two years, no recurrence of hemospermia was reported.

Other than initial use in accurate staging of prostatic cancer, genital obstruction, a potentially surgically curable cause of male infertility, can be detected with the use of MRI with endorectal surface.<sup>7)</sup> Widespread use of vasography should be limited due to its invasiveness to the subtle structures of vas deference, seminal vesicles, and ejaculatory ducts<sup>8)</sup>.

MR imaging with an endorectal surface coil can offer definite soft tissue resolution, which can aid in evaluating anatomic relationships of prostate and seminal tract. It can also clearly visualize ejaculatory duct, ampulla of vas deference, and verumontanum. Multiaxial section is possible, and when combined with body surface coils, wide field of view can be simultaneously evaluated, MR imaging with an endorectal surface coil is a powerful modality in evaluating seminal tracts of hemospermia patients, and it can be clinically applied when the informations obtained by transrectal ultrasonography are not satisfactory.

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