

**Hemospermia
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
1. Ahmad I, Krishna NS. Hemospermia. <i>J Urol.</i> 2007;177(5):1613-1618.	Review/Other-Dx	N/A	Review literature on hemospermia with emphasis on etiology, diagnosis and management.	Most patients can be treated with minimal investigations and simple reassurance. In older patients or those with persistent hemospermia or associated symptoms further investigation in the form of TRUS, MRI and cystoscopy is of proven benefit.	4
2. Coppens L, Bonnet P, Andrienne R, de Leval J. Adult mullerian duct or utricle cyst: clinical significance and therapeutic management of 65 cases. <i>J Urol.</i> 2002;167(4):1740-1744.	Observational-Tx	65 adults	Define guidelines for the exploration and treatment of adult Müllerian duct cysts. Clinical presentation, diagnostic modalities, indications for invasive procedures and postoperative outcome were reviewed.	Clinical presentations were hemospermia in 40% of cases, other ejaculatory disturbances in 20%, recurrent testicular or perivaginal pain in 33%, lower urinary tract irritation symptoms in 25%, lower urinary tract infection in 18.5%, male infertility in 12% and incidental finding in 18.5%.; Cyst dimensions did not influence the indication for invasive procedures, which were performed in 27/65 patients (41.5%) to treat disabling symptoms in 28% and obstructive infertility in 5%, and investigate complicated cysts on TRUS in 6%. These procedures included transperineal or transrectal puncture in 9 patients, simple endoscopic section of the utricle meatus in 12 and large marsupialisation in 6.; Endoscopic procedures improved or cured 82% of the patients at a mean follow-up of 51 months, during which neither early nor late complications were noted.; Authors recommend that investigation and/or treatment be done in symptomatic or infertile patients.	2

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<p>3. Furuya S, Furuya R, Masumori N, Tsukamoto T, Nagaoka M. Magnetic resonance imaging is accurate to detect bleeding in the seminal vesicles in patients with hemospermia. <i>Urology</i>. 2008;72(4):838-842.</p>	<p>Observational-Dx</p>	<p>26 patients with hemospermia ; 15 had transperineal aspiration of the seminal vesicles under TRUS guidance to confirm the bleeding</p>	<p>To confirm the presence of hemorrhage in the seminal vesicles by aspiration in patients with findings suspicious for hemorrhage on MRI; and to investigate the relationship between findings on MRI and the freshness of hemorrhage.</p>	<p>Bloody fluid was aspirated from all seminal vesicles showing a pattern suggestive of bleeding on MRI. The morphologic analysis of red blood cells in the fluid indicated relatively fresh hemorrhage in the seminal vesicles showing high-intensity signals on T1-weighted images and low-intensity signals on T2-weighted images (group A), but old hemorrhage in those showing high-intensity signal on T1-weighted images as well as T2-weighted images (group B). In 3 patients of group A who did not receive aspiration, repeated MRI during the follow-up showed that the signal intensity changed from low to high on T2-weighted images. On the other hand, in 2 patients of group B, who received aspiration, repeated MRI performed 12 and 7 days after aspiration showed low signal intensity on T2-weighted images.</p>	<p>3</p>

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4. Furuya S, Ogura H, Saitoh N, Tsukamoto T, Kumamoto Y, Tanaka Y. Hematospermia: an investigation of the bleeding site and underlying lesions. <i>Int J Urol.</i> 1999;6(11):539-547; discussion 548.	Review/Other-Dx	21 patients	To evaluate the site of hemorrhage and causative lesions in patients with hematospermia using the puncture technique for seminal vesicles and/or Müllerian duct cysts under US guidance.	Dark reddish seminal vesicle fluid was aspirated and the site of bleeding was considered to be the seminal vesicles in 11 patients (52%) (group A). In group A, abnormalities of the seminal vesicles were noted in 9 patients (82%). These consisted of dilated seminal vesicles in 7 (bilateral in 4, unilateral in 3), a seminal vesicle cyst in one and seminal vesicle amyloidosis in one. A Müllerian duct cyst was confirmed to be the bleeding site in 2 patients (10%; group B). The bleeding site was estimated to be organs rather than the seminal vesicles in 4 patients (group C), in all of whom ectopic prostatic tissue was observed in the prostatic urethra. In groups B and C, seminal vesicle abnormalities were not detected by TRUS. In the remaining 4 patients (group D), failure to aspirate seminal vesicle fluid means that it is unclear whether hemorrhage was from the seminal vesicle or from another source. In group D, ectopic prostatic tissue was demonstrated in the prostatic urethra of 3 patients and unilateral seminal vesicle dilation was detected by TRUS in one patient.	2
5. Leary FJ, Aguilo JJ. Clinical significance of hematospermia. <i>Mayo Clin Proc.</i> 1974;49(11):815-817.	Review/Other-Dx	200 patients with hematospermia	Documentation on the clinical experience of patients with hematospermia.	General physical examination including digital rectal palpation and urinalysis is good for examining patients. No further diagnostic procedures are necessary if no abnormalities are detected.	4
6. Leocadio DE, Stein BS. Hematospermia: etiological and management considerations. <i>Int Urol Nephrol.</i> 2009;41(1):77-83.	Review/Other-Dx	N/A	To provide the primary care physician an algorithm for the evaluation and management of hematospermia based on frequency of occurrence and patient age.	Typically, patients present to their primary care physician after a single episode of hematospermia out of concern for malignancy or venereal disease. In men ≤40 years of age, it is most often due to inflammatory or infectious processes. In men >40 years of age, however, an association exists between hematospermia and more serious underlying pathology. A significant number of cases remain idiopathic even after extensive investigation.	4

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7. Li BJ, Zhang C, Li K, et al. Clinical analysis of the characterization of magnetic resonance imaging in 102 cases of refractory haemospermia. <i>Andrology</i> . 2013;1(6):948-956.	Review/Other-Dx	102 patients	To analyze the pathogenesis of persistent and refractory hemospermia and to evaluate the etiological diagnostic value of MRI for this type of hemospermia.	Of the 102 patients that underwent MRI examination, data from 88 patients (86.3%) showed typical and characteristic changes in the emergency department area, including the signal intensity changes in 60 (58.8%), seminal vessel volume changes in 32 (31.4%), the formation of cysts such as prostatic utricular cysts in 27 (26.5%), Müllerian cysts in 4 (3.9%), emergency department cysts in 5 (4.9%) and a seminal vessel cyst in 1(1.0%). The MRI findings were confirmed by seminal vesiculoscopy and all patients received appropriate treatment. In 14 patients (13.7%), no obvious abnormal changes were observed with MRIs; however, these patients were diagnosed and successfully managed using seminal vesiculoscopy. Some degrees of emergency department obstruction was usually found during surgery. The symptoms of hemospermia disappeared 1–2 months after surgery in all patients. Two patients had a recurrence of hemospermia, underwent the same treatment, and recovered during the follow-up period.	4
8. Littrup PJ, Lee F, McLeary RD, Wu D, Lee A, Kumasaka GH. Transrectal US of the seminal vesicles and ejaculatory ducts: clinical correlation. <i>Radiology</i> . 1988;168(3):625-628.	Observational-Dx	52 patients	To examine role of TRUS in seminal vesicles and ejaculatory ducts.	TRUS may provide clinical insight into the causes of significant genitourinary symptoms that may previously have been ascribed to chronic nonbacterial prostatitis or have been considered to be idiopathic.	4
9. Papp GK, Kopa Z, Szabo F, Erdei E. Aetiology of haemospermia. <i>Andrologia</i> . 2003;35(5):317-320.	Review/Other-Dx	N/A	Review etiology of hemospermia.	Prostatic calculi, chronic prostatitis and carcinoma of the prostate unequivocally were found as most frequent of hemospermia. Considering the rare genital malignancies more than 10% frequency was found. Only 2.4% of the malignancies occurred in patients under 40 years of age. Hence a detailed diagnosis is advocated in hemospermia patients over 40 years. 15% of patients with hemospermia had unknown etiology.	4

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10. Prando A. Endorectal magnetic resonance imaging in persistent hemospermia. <i>Int Braz J Urol.</i> 2008;34(2):171-177; discussion 177-179.	Review/Other-Dx	86 patients	To present the spectrum of abnormalities found at endorectal MRI in patients with persistent hemospermia.	Endorectal MRI showed abnormal findings in 52/86 (60%) patients with hemospermia. Endorectal MRI is recommended for the evaluation of patients with persistent hemospermia.	4
11. Torigian DA, Ramchandani P. Hemospermia: imaging findings. <i>Abdom Imaging.</i> 2007;32(1):29-49.	Review/Other-Dx	N/A	Review potential etiologies, diagnostic workup, imaging techniques, relevant male pelvic anatomy, imaging appearance of specific associated pathologies, and treatment for hemospermia.	Noninvasive imaging may play an important role in the diagnostic workup of men with hemospermia, particularly in those who are >40 years old, have other associated symptoms or signs of disease, or have persistence of hemospermia.	4
12. Yagci C, Kupeli S, Tok C, Fitoz S, Baltaci S, Gogus O. Efficacy of transrectal ultrasonography in the evaluation of hemospermia. <i>Clin Imaging.</i> 2004;28(4):286-290.	Review/Other-Dx	54 consecutive patients with hemospermia	To assess the efficacy of TRUS in the evaluation of hemospermia.	TRUS revealed one or more abnormalities in 51 patients (94.5%). Prostatic calcifications were found in 23 patients, ejaculatory duct calculi in 21, dilated ejaculatory ducts in 18, BPH in 18, and dilated seminal vesicles in 12, calcifications in seminal vesicles in 11, ejaculatory duct cyst in 6, prostatitis in 6, and periurethral Cowper gland mass in 1. TRUS is a noninvasive, safe method for the investigation of causes of hemospermia. It should be the first radiological investigation.	4
13. Zhao H, Luo J, Wang D, et al. The value of transrectal ultrasound in the diagnosis of hemospermia in a large cohort of patients. <i>J Androl.</i> 2012;33(5):897-903.	Observational-Dx	270 patients	Patients with hemospermia were evaluated by TRUS to assess its efficacy in the etiologic diagnosis of hemospermia.	Abnormalities were revealed by TRUS in 256 patients (94.8%). The percentages of pathological conditions located in the seminal vesicles, in the ejaculatory ducts, in the prostate, and in the bladder were 46.3% (125 cases), 29.6% (80 cases), 55.2% (149 cases), and 0.4% (1 case), respectively. The number of patients > 40 years old and 40 years old or younger were 126 and 144, respectively.	3
14. Ng YH, Seeley JP, Smith G. Haemospermia as a presenting symptom: outcomes of investigation in 300 men. <i>Surgeon.</i> 2013;11(1):35-38.	Review/Other-Dx	300 patients	To investigate hemospermia as a presenting symptom of significant underlying pathology and to assess the diagnostic value of routine urological investigations.	Of 469 investigative episodes, comprising: 206 flexible cystoscopies, 232 renal USs, 16 intravenous urograms and 15 scrotal USs; only 2 (0.4%) resulted in findings of significant new pathology which required surgical intervention. 13 prostate cancers were detected (5.7%) and 2 of dysplasia, all in men over 40 years either with a PSA of >3.0 ng/dL or an abnormal DRE.	4

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15. Han M, Brannigan RE, Antenor JA, Roehl KA, Catalona WJ. Association of hemospermia with prostate cancer. <i>J Urol.</i> 2004;172(6 Pt 1):2189-2192.	Observational-Dx	26,126 ambulatory men 50 years or older (40 years or older with a family history of prostate cancer or black race)	To examine the incidence of hemospermia and the association between prostate cancer and hemospermia in a large prostate cancer screening population.	Prostate cancer was detected in 1,708 of the 26,126 men (6.5%) who underwent prostate cancer screening. Prostate cancer was diagnosed in 19/139 men (13.7%) who reported hemospermia upon entering the prostate cancer screening study. 10/13 men who underwent radical retropubic prostatectomy had stage pT2 disease, while 3 had stage pT3 disease. In the logistic regression model hemospermia was a significant predictor of prostate cancer diagnosis after adjusting for age, PSA and DRE results (OR 1.73, $P=0.054$).	3
16. Wilson C, Boyd K, Mohammed A, Little B. A single episode of haemospermia can be safely managed in the community. <i>Int J Clin Pract.</i> 2010;64(10):1436-1439.	Review/Other-Dx	41 patients	The aim of this study is threefold. First, to establish what investigations are required in cases of hemospermia, in a population that is not participating in a formal PSA screening program. Second, to establish what investigations are valueless and can be safely omitted. Finally, we aim to establish if all the investigations that are required for a single episode of hemospermia can be delivered in a general practice/community medical setting.	The central findings were that abdominal US never yielded an abnormality and that flexible cystoscopy never showed bladder tumors. TRUS prostate biopsies were performed in 17% of patients, and prostate cancer was confirmed in 5% of patients. Testicular malignancy was found in 2%. In 90% of patients, no specific diagnosis was made, and 85% of patients were discharged at review.	4
17. Han WK, Lee SR, Rha KH, Kim JH, Yang SC. Transutricular seminal vesiculoscopy in hemospermia: technical considerations and outcomes. <i>Urology.</i> 2009;73(6):1377-1382.	Observational-Tx	70 patients	To describe our current technique of transutricular seminal vesiculoscopy and review the outcomes in diagnosing and treating disorders of the seminal vesicles.	In our 70 patients, the mean age was 46.5 years (range 28–68). The mean follow-up period was 12.3 months (range 1–48). Hemospermia subsided in 55 patients (78.6%) who did not respond to medical therapy with endoscopic fenestration alone. However, hemospermia recurred in 7 patients (10%). Hemorrhage was found in the seminal vesicles and in the ejaculatory ducts in 48 (68.6%) and 5 (7.1%) patients, respectively.	3
18. Liu ZY, Sun YH, Xu CL, et al. Transurethral seminal vesiculoscopy in the diagnosis and treatment of persistent or recurrent hemospermia: a single-institution experience. <i>Asian J Androl.</i> 2009;11(5):566-570.	Observational-Tx	72 patients	To assess whether transurethral seminal vesiculoscopy is feasible and effective in the diagnosis and treatment of hemospermia.	Definite diagnosis was made for 93.1% patients, and 94.4% patients were cured or showed a decrease in their symptoms. Postoperative complications were not observed in the study.	3

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19. Xing C, Zhou X, Xin L, et al. Prospective trial comparing transrectal ultrasonography and transurethral seminal vesiculoscopy for persistent hematospermia. <i>Int J Urol.</i> 2012;19(5):437-442.	Observational-Dx	106 patients	To compare the diagnostic yield of TRUS and transurethral seminal vesiculoscopy in patients with persistent hematospermia, and to determine the advantages and disadvantages of both modalities.	Final diagnoses were made in 93 patients (87.7%), with TRUS and transurethral seminal vesiculoscopy showing overall diagnostic yields of 45.3% and 74.5%, respectively ($P<0.001$). The diagnostic yield of combining TRUS and transurethral seminal vesiculoscopy was significantly higher than that of each modality alone (both $P<0.001$). Of the 114 findings of diagnostic value, the most frequent was calculus (47.4%, $n = 54$), followed by obstruction/stricture (37.7%, $n = 43$), cyst (8.8%, $n = 10$), dysplasia (3.5%, $n = 4$), polyp (1.8%, $n = 2$) and benign mass (0.9%, $n = 1$). Transurethral seminal vesiculoscopy showed significant superiority in detecting calculi and obstruction/stricture. Hematospermia disappeared in 95.3% (101/106) of all patients and in 97.6% (83/85) of patients receiving transurethral seminal vesiculoscopy therapy during follow-up. No major adverse effects occurred during and after examination.	2
20. Szlauer R, Jungwirth A. Haematospermia: diagnosis and treatment. <i>Andrologia.</i> 2008;40(2):120-124.	Review/Other-Dx	N/A	Review the etiology, diagnosis and treatment of hematospermia.	No results stated in abstract.	4
21. Li YF, Liang PH, Sun ZY, et al. Imaging diagnosis, transurethral endoscopic observation, and management of 43 cases of persistent and refractory hematospermia. <i>J Androl.</i> 2012;33(5):906-916.	Observational-Tx	43 patients	To explore minimally invasive transurethral imaging and surgery for the treatment of severe, persistent hematospermia in cases that were refractory to conservative treatments.	The causes of hematospermia were identified in all 43 patients, and their ejaculatory duct obstruction or seminal vesiculitis was successfully treated. No serious intraoperative or postoperative complications occurred. Pathologic analyses revealed that all of the resected or biopsied seminal vesicle tissues had chronic nonspecific inflammation in the seminal vesicle wall, and no tumors were identified. Preoperative symptomology of hematospermia disappeared in all patients followed up for 2 to 30 months (average, 16 months). A single patient experienced recurrence at 11 months and had a second minimally invasive surgery that was curative. A total of 95.3% (41 of 43) of the patients experienced normal orgasmic intensity after surgery.	3

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22. Sosna J, Pedrosa I, Dewolf WC, Mahallati H, Lenkinski RE, Rofsky NM. MR imaging of the prostate at 3 Tesla: comparison of an external phased-array coil to imaging with an endorectal coil at 1.5 Tesla. <i>Acad Radiol.</i> 2004;11(8):857-862.	Observational-Dx	20 cases	To qualitatively compare the image quality of torso phased-array 3T imaging of the prostate with that of endorectal 1.5T imaging.	3T produced a significantly better image quality compared with the small fields of view for posterior border ($P=.0001$), seminal vesicles ($P=.0001$), and image quality rating ($P=.0001$). There was a marginally significant difference within the neurovascular bundles category ($P=.0535$). 3T produced an image of similar quality to image quality at 1.5T for posterior border ($P=.3893$), seminal vesicles ($P=.8680$), neurovascular bundles ($P=.2684$), and image quality rating ($P=.8599$).	2
23. Wang LJ, Tsui KH, Wong YC, Huang ST, Chang PL. Arterial bleeding in patients with intractable hematospermia and concomitant hematuria: a preliminary report. <i>Urology.</i> 2006;68(5):938-941.	Review/Other-Dx	5 patients	To assess the presence of arterial bleeding and its outcome after TAE in patients with intractable hematospermia and concomitant hematuria.	Arterial bleeding mainly from the internal pudendal artery was revealed by angiography in all 5 patients. The cessation of bleeding by TAE was successfully achieved in all patients. Hematospermia was improved in 3 patients. In the other 2 patients, hematospermia subsided after TAE but recurred at 12 and 23 months. Subsequent angiography of the 2 patients showed recurrent arterial bleeding, fed by blood flow from the opposite side. One of the 2 patients agreed to undergo a second TAE, after which the hematospermia disappeared. None of the 5 patients had impotence at follow-up.	4
24. Zargooshi J, Nourizad S, Vaziri S, et al. Hemospermia: long-term outcome in 165 patients. <i>Int J Impot Res.</i> 2014;26(3):83-86.	Review/Other-Tx	157 patients	To report our experience with 165 hemospemic patients who have been visited and followed by the first author during a 15-year period.	Diagnostic evaluation of hemospermia is not worthwhile in the absolute majority of cases. Advanced age makes no difference. Only high-risk patients need to be evaluated. The vast majority of cases may be safely and effectively treated with empiric therapy. Almost all patients do well in long term.	4
25. Aslam MI, Cheetham P, Miller MA. A management algorithm for hematospermia. <i>Nat Rev Urol.</i> 2009;6(7):398-402.	Review/Other-Dx	N/A	Review literature in an attempt to present a cohesive view of the etiologies and diagnostic and management strategies in patient's hematospermia.	No results stated in abstract.	4

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26. Furuya S, Kato H. A clinical entity of cystic dilatation of the utricle associated with hemospermia. <i>J Urol.</i> 2005;174(3):1039-1042.	Review/Other-Tx	138 patients with hemospermia (30 [22%] had midline cyst)	To examine the clinical significance of cystic dilatation of the utricle as a lesion underlying hemospermia and the importance of the relationship between such structures.	Seminal vesicle fluid on 1 or 2 sides was hemorrhagic in 13/19 patients (aspiration failed in 6) and fluid from the midline cyst was nonhemorrhagic in 5/19 (aspiration failed in 7). The midline cyst communicated with the urethra (cystic dilatation of the utricle) in 15 patients (79%) and with 1 or 2 ejaculatory ducts in 11 (58%). In 5/11 patients with communication with the ejaculatory duct hemospermia persisted for more than 1 year. Four of these patients were cured by transurethral unroofing of the cystic dilatation of the utricle.	4
27. American College of Radiology. ACR Appropriateness Criteria®: Prostate Cancer — Pretreatment Detection, Staging, and Surveillance. Available at: https://acsearch.acr.org/docs/69371/Narrative/ .	Review/Other-Dx	N/A	Evidence-based guidelines to assist referring physicians and other providers in making the most appropriate imaging or treatment decision for a specific clinical condition.	N/A	4
28. Ishikawa M, Okabe H, Oya T, et al. Midline prostatic cysts in healthy men: incidence and transabdominal sonographic findings. <i>AJR Am J Roentgenol.</i> 2003;181(6):1669-1672.	Observational-Dx	1,826 transabdominal US examinations performed on 1,115 men	To use transabdominal US to investigate the incidence of midline prostatic cysts in healthy men.	Midline prostatic cysts represent a common variant in asymptomatic men. In a patient with urologic symptoms, detection of a midline prostatic cyst requires a focused examination to determine whether the cyst represents a normal variant or is the cause of symptoms.	4
29. Untergasser G, Madersbacher S, Berger P. Benign prostatic hyperplasia: age-related tissue-remodeling. <i>Exp Gerontol.</i> 2005;40(3):121-128.	Review/Other-Dx	N/A	A summary of the multifactorial nature of prostate tissue remodeling in elderly men with symptomatic BPH with a particular focus on changes of cell-cell interactions and cell functions in the human aging prostate.	Life-long stress, pleiotrope mechanisms/factors and noxes on metabolically highly active epithelia seem to be main triggers for initiation of BPH and organ enlargement. Thus, the identification of essential factors involved in the mechanisms of organ-specific tissue-remodeling will be essential for the prevention and treatment of age-related aberrant prostate growth.	4

Evidence Table Key

Study Quality Category Definitions

- *Category 1* The study is well-designed and accounts for common biases.
- *Category 2* The study is moderately well-designed and accounts for most common biases.
- *Category 3* There are important study design limitations.
- *Category 4* The study is not useful as primary evidence. The article may not be a clinical study or the study design is invalid, or conclusions are based on expert consensus. For example:
 - a) the study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description);
 - b) the study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence;
 - c) the study is an expert opinion or consensus document.
- M = Meta-analysis

Dx = Diagnostic

Tx = Treatment

Abbreviations Key

BPH = Benign prostatic hyperplasia

DRE = Digital rectal examination

MRI = Magnetic resonance imaging

OR = Odds ratio

PSA = Prostate specific antigen

TAE = Transcatheter arterial embolization

TRUS = Transrectal ultrasound

US = Ultrasound