Obstructive Voiding Symptoms Secondary to Prostate Disease
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
1. O'Brien WM. Benign prostatic hypertrophy. *Am Fam Physician* 1991; 44(1):162-171.	7	N/A	To review physiology, presentation and treatment of being prostatic hypertrophy.	The mainstay of treatment is transurethral resection of the prostate. It provides relief in 85% of patients.	3
2. Takeda M, Araki I, Kamiyama M, Takihana Y, Komuro M, Furuya Y. Diagnosis and treatment of voiding symptoms. *Urology* 2003; 62(5 Suppl 2):11-19.	12	N/A	To review signs, symptoms and diagnosis of urinary tract obstructive symptoms.	Pressure flow study is an important test for differential diagnosis between obstruction and non-obstructive patients, but alternative noninvasive tests are necessary due to its shortcomings.	3
3. Berger AP, Horninger W, Bektic J, et al. Vascular resistance in the prostate evaluated by colour Doppler ultrasonography: is benign prostatic hyperplasia a vascular disease? *BJU Int* 2006; 98(3):587-590.	10	92	To prospectively evaluate patients with color Doppler US to determine if benign prostatic hyperplasia is a vascular disease. The resistive index (RI) values were assessed.	High RI (>0.75) values in transition zone are indicative of benign prostatic hyperplasia. Age-related impairment of blood supply may have role in development of benign prostatic hyperplasia.	2
4. Kuo HC, Chang SC, Hsu T. Predictive factors for successful surgical outcome of benign prostatic hypertrophy. *Eur Urol* 1993; 24(1):12-19.	13	400	Search for factors predictive of a successful outcome of patients with benign prostatic hypertrophy undergoing surgery.	A symptomatic large prostatic adenoma identified by intravenous urography (IVU), transrectal sonography of the prostate, and urethral pressure profilometry will imply a higher success rate.	2
5. Andersen JT, Jacobsen O, Standgaard L. The diagnostic value of intravenous pyelography in infravesical obstruction in males. *Scand J Urol Nephrol* 1977; 11(3):225-230.	10	104	Prospective studies to determine the value of intravenous pyelography in male patients with infravesical obstruction.	Intravenous pyelography should not be performed as a routine procedure in patients with benign prostatic hypertrophy, but only on clinical suspicion of upper urinary tract pathology.	2
6. Beacock CJ, Roberts EE, Rees RW, Buck AC. Ultrasound assessment of residual urine. A quantitative method. *Br J Urol* 1985; 57(4):410-413.	13	15	To describe a method of measuring residual urine with US.	Determination of residual urine is best performed with US.	3
7. Brooks AP. Prostatism, intravenous urography and asymptomatic renal cancer. *Br J Urol* 1988; 62(1):1-3.	12	N/A	To determine value of performing intravenous urogram in asymptomatic patient.	Difficult to justify routine intravenous urogram exams in patients with prostatism. A radiograph of value to detect calculi. US of upper and/or lower urinary tract can be alternative to intravenous urogram.	4
8. Cascione CJ, Bartone FF, Hussain MB. Transabdominal ultrasound versus excretory urography in preoperative evaluation of patients with prostatism. *J Urol* 1987; 137(5):883-885.	9	53	To compare US and excretory urography in preoperative evaluation of patients with prostatism.	US is more accurate in defining prostatic size and configuration.	2

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9. Chancellor MB, VanAppledorn CA. Value of transrectal prostate ultrasonography pre-transurethral prostatectomy in screening for occult prostate carcinoma. *Urology* 1993; 41(6):590-593.	10	311	Retrospective studies to determine value of transrectal prostate US as a screening tool for occult prostate carcinoma.	Sensitivity of prostate US was 8.3 % and specificity was 56.6 %. US has little value in predicting absence of presence or occult prostate cancer.	2
10. de Lacey G, Johnson S, Mee D. Prostatism: how useful is routine imaging of the urinary tract? *Br Med J (Clin Res Ed)* 1988; 296(6627):965-967.	13	128	Prospective evaluation of the clinical effects of routinely imaging the renal tract.	Patients scheduled for conservative management should have US to detect unsuspected hydronephrosis, but in all other patients, urography or US, or both, is unhelpful.	2
11. Griffiths CJ, Murray A, Ramsden PD. Accuracy and repeatability of bladder volume measurement using ultrasonic imaging. *J Urol* 1986; 136(4):808-812.	9	10	To assess methods of calculating bladder volume with US.	For volume >150 ml, accuracy of 87% and repeatability of ± 9% was seen.	3
12. Henneberry M, Carter MF, Neiman HL. Estimation of prostatic size by suprapubic ultrasonography. *J Urol* 1979; 121(5):615-616.	10	29	Prospective studies to determine accuracy of US in determining prostate weight.	US is accurate in determining prostate weight. Significant correlation (r=0.95) between prostatic weight and postoperative weight of the adenoma.	3
13. Hricak H, Jeffrey RB, Dooms GC, Tanagho EA. Evaluation of prostate size: a comparison of ultrasound and magnetic resonance imaging. *Urol Radiol* 1987; 9(1):1-8.	9	15	Compare US and MRI with surgical findings to determine relative accuracy of US and MRI in the evaluation of prostate volume.	Neither methodology could determine benign from malignant. MRI predicted volume accurately.	3
14. Roehrborn CG, Chinn HK, Fulgham PF, Simpkins KL, Peters PC. The role of transabdominal ultrasound in the preoperative evaluation of patients with benign prostatic hypertrophy. *J Urol* 1986; 135(6):1190-1193.	9	59	To determine role of transabdominal US in the preoperative evaluation of patients with benign prostatic hypertrophy. Compared excretory urography, post voiding volumes, uroflowmetry, and transabdominal US.	Best predictor of prostate weight is US (r=0.975).	2
15. Roehrborn CG, Peters PC. Can transabdominal ultrasound estimation of postvoiding residual (PVR) replace catheterization? *Urology* 1988; 31(5):445-449.	9	81	To compare US volume measurement to catheterization in the calculation of bladder volume.	US should replace catheterization and eliminate hazards of trauma and infections.	2
16. Sage WM, Kessler R, Sommers LS, Silverman JF. Physician-generated cost containment in transurethral prostatectomy. *J Urol* 1988; 140(2):311-315.	15	356	To present suggestions for scientific cost management in prostatectomy.	Significant decreases in preoperative and postoperative length of stay, specific ordering practices and total hospital charges can occur with transurethral prostatectomy.	2

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17. Schiebler ML, Tomaszewski JE, Bezzi M, et al. Prostatic carcinoma and benign prostatic hyperplasia: correlation of high-resolution MR and histopathologic findings. *Radiology* 1989; 172(1):131-137.	13	24	To correlate the histopathologic features of resected prostate glands with their appearance on high-resolution MRI.	MRI was useful in defining the extent of macroscopic nodules of prostatic carcinoma in the peripheral zone and the central gland. Benign prostatic hyperplasia pattern was variable.	3
18. Sukov RJ, Scardino PT, Sample WF, Winter J, Confer DJ. Computed tomography and transabdominal ultrasound in the evaluation of the prostate. *J Comput Assist Tomogr* 1977; 1(3):281-289.	9	8	Prospective study to compare US and CT findings in the evaluation of prostate.	US gave better histopathologic information and was better in volume determination.	4
19. Talner LB. Specific causes of obstruction. In: Pollack HM ed. Clinical urography. Philadelphia, Pa. *WB Saunders*; 990:chapter 56.	15	N/A	Book chapter.	N/A	N/A
20. Talner LB. Routine urography in men with prostatism. *AJR* 1986; 147(5):960-961.	12	N/A	Prospective study to evaluate 12 reported series relative to the value of urography.	The balance of evidence is against routine urography in men with prostatism.	4
21. Wasserman NF, Lapointe S, Eckmann DR, Rosel PR. Assessment of prostatism: role of intravenous urography. *Radiology* 1987; 165(3):831-835.	10	502	Prospective study to determine the value of routine IVP.	IVP should be limited to patients with positive findings in clinical work-up. Radiographs recommended in others.	2
22. Grossfeld GD, Coakley FV. Benign prostatic hyperplasia: clinical overview and value of diagnostic imaging. *Radiol Clin North Am* 2000; 38(1):31-47.	12	N/A	Clinical overview and diagnostic imaging of benign prostatic hyperplasia.	Routine upper tract imaging not indicated in patients with lower urinary tract symptoms. Local imaging of prostate can be performed with transrectal US or MRI.	3
23. Stacul F, Rossi A, Cova MA. CT urography: the end of IVU? *Radiol Med (Torino)* 2008; 113(5):658-669.	12	N/A	Review literature comparing diagnostic accuracy of MDCTU and IVP.	MDCTU has a high diagnostic accuracy.	3
24. McAchran SE, Hartke DM, Nakamoto DA, Resnick MI. Sonography of the Urinary Bladder. *Ultrasound Clinics* 2007; 2(1):17-26.	12	N/A	To review usefulness of bladder US.	Bladder US is useful in determination of the presence and volume of postvoid residual urine, assessment of suspected bladder stones, diverticula, and other lesions, evaluation of the bladder neck for hypermobility , and assessment of pediatric patients who have posterior urethral valves, ureteroceles, and, more recently, vesicoureteral reflux.	4

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25. Tsuru N, Kurita Y, Suzuki K, Fujita K. Resistance index in benign prostatic hyperplasia using power Doppler imaging and clinical outcomes after transurethral vaporization of the prostate. *Int J Urol* 2005; 12(3):264-269.	13	43	To examine change of RI before and after transurethral vaporization of the prostate in benign prostatic hyperplasia patients using power Doppler imaging and clinical outcomes.	RI significantly decreased post therapy as did other urodynamic parameters. RI could be used to evaluate severity of benign prostatic hyperplasia.	2
26. Amiel GE, Slawin KM. Newer modalities of ultrasound imaging and treatment of the prostate. *Urol Clin North Am* 2006; 33(3):329-337.	12	N/A	To review developments in US of the prostate.	Evaluation of benign prostatic hypertrophy does not require routine imaging of prostate. Transrectal US useful for size and texture. Transabdominal US useful for upper tracts and bladder volume.	3
27. Halpern EJ, Ramey JR, Strup SE, Frauscher F, McCue P, Gomella LG. Detection of prostate carcinoma with contrast-enhanced sonography using intermittent harmonic imaging. *Cancer* 2005; 104(11):2373-2383.	10	301	To assess prostate carcinoma detection and discrimination of benign from malignant prostate tissue with contrast-enhanced US.	Detection rate of malignancy in contrast enhanced cases greater than with sextant biopsies.	2
28. Hamper UM, Trapanotto V, DeJong MR, Sheth S, Caskey CI. Three-dimensional US of the prostate: early experience. *Radiology* 1999; 212(3):719-723.	9	16	To assess feasibility of 3D endorectal transducer US in the prostate gland. Patients had 3D following conventional 2D US.	3D US allowed better visualization of the gland and focal lesions. Prostatic volumes obtained from 3D US were consistently smaller than volumes obtained from 2D US (20% difference, p=.006). 3D was superior to 2D US in depicting tumor presence (9 of 10 right hemispheres, 3 out of 8 left hemispheres) and extraglandular extent of disease (3 of 5 hemispheres).	3
29. Oelke M, Hofner K, Jonas U, de la Rosette JJ, Ubbink DT, Wijkstra H. Diagnostic accuracy of noninvasive tests to evaluate bladder outlet obstruction in men: detrusor wall thickness, uroflowmetry, postvoid residual urine, and prostate volume. *Eur Urol* 2007; 52(3):827-834.	9	160	Prospective study to compare the diagnostic accuracy of detrusor wall thickness (DWT), free uroflowmetry, postvoid residual urine, and prostate volume (index tests) with pressure-flow studies (reference standard) to detect bladder outlet obstruction in men.	DWT was the most accurate test: PPV was 94%, specificity 95%, and the area under the curve of ROC analysis 0.93. There was an agreement of 89% between the results of DWT measurement and pressure-flow studies.	2
30. Liney GP, Turnbull LW, Knowles AJ. In vivo magnetic resonance spectroscopy and dynamic contrast enhanced imaging of the prostate gland. *NMR Biomed* 1999; 12(1):39-44.	13	N/A	To describe in vivo 1H MR spectroscopy and dynamic contrast enhanced imaging of the prostate gland.	The combined use of in vivo 1H MR spectroscopy and dynamic contrast enhanced MRI studies may improve the staging accuracy of MRI.	3

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31. Juul N, Torp-Pedersen S, Nielsen H. Abdominal ultrasound versus intravenous urography in the evaluation of infravesically obstructed males. *Scand J Urol Nephrol* 1989; 23(2):89-92.	9	100	Prospective study to compare IVP and abdominal US in the evaluation infravesically obstructed males.	US is preferred because of: • Better characterization of renal masses. • The possibility of investigating the liver and the retroperitoneum in the same setting. • Better evaluation of the prostate with respect to size. • Better evaluation of the bladder. Economical reasons.	2
32. Kalb B, Votaw JR, Salman K, Sharma P, Martin DR. Magnetic resonance nephrourography: current and developing techniques. *Radiol Clin North Am* 2008; 46(1):11-24, v.	12	N/A	Review of MR nephrourography.	MR nephrourography makes it possible to obtain both structural and functional data within a single imaging examination.	4
33. McConnell JD, Barry MJ, Bruskewitz RC. Benign prostatic hyperplasia: diagnosis and treatment. Agency for Health Care Policy and Research. *Clin Pract Guidel Quick Ref Guide Clin* 1994; (8):1-17.	15	N/A	Practice Guideline (diagnosis, and treatment of benign prostatic hyperplasia).	N/A	N/A

Evidence Table Key

Study Type Key

Numbers 1-7 are for studies of therapies while numbers 8-15 are used to describe studies of diagnostics.

1. Randomized Controlled Trial — Treatment
2. Controlled Trial
3. Observation Study
    a. Cohort
    b. Cross-sectional
    c. Case-control
4. Clinical Series
5. Case reviews
6. Anecdotes
7. Reviews
8. Randomized Controlled Trial — Diagnostic
9. Comparative Assessment
10. Clinical Assessment
11. Quantitative Review
12. Qualitative Review
13. Descriptive Study
14. Case Report
15. Other (Described in text)

Strength of Evidence Key

- Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis and results.
- Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.
- Category 3 - The conclusions of the study may be valid but the evidence supporting the conclusions is inconclusive or equivocal.
- Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.