507

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ESTABLISHMENT OF A GRADING SYSTEM FOR BLADDER TRABECULATION

Hypothesis / aims of study

This study aims to establish a grading system for bladder trabeculation and evaluate its clinical significance.

Study design, materials and methods

A total of 228 patients who underwent videourodynamic studies were retrospectively reviewed. All fluoroscopic and cystoscopic images included were randomly retrieved. We classified images into 4 grades of trabeculation according to maximum depth and portion of bladder surface occupied: 0 (none), 1 (mild, depth <5 mm and area <1/2 of bladder), 2 (moderate, depth 5 - 10 mm and area ≥1/2 of bladder), and 3 (severe, depth >10 mm and area ≥1/2 of bladder). Presence of vesicoureteral refluxes, urethral leaks and diverticula was evaluated. Grades were determined by 9 participants, and test-retest reliability was assessed over 2 weeks. To evaluate inter-observer and test-retest reliabilities, the intraclass correlation coefficient and Crohn's kappa were analyzed, respectively.

Results

Mean trabeculation depths were 6.5 ± 6.1 mm. With increasing trabeculation grade, refluxes and urethral leaks also increased. Number of diverticula was unrelated to grade. Inter-observer reliability of trabeculation grades among 9 participants was assessed, and the intraclass correlation coefficients were 0.985 (95% CI 0.981 – 0.988, p <0.001) in fluoroscopic images and 0.981 (95% CI 0.976-0.985, p <0.001) in cystoscopic images. Test-retest reliability of 9 participants was assessed, and all values for Crohn's kappa ranged from 0.870 to 0.955. The intraclass correlation coefficient of bladder trabeculation grades between fluoroscopic and cystoscopic images ranged from 0.542 to 0.630

Interpretation of results

Inter-observer reliability was almost perfect and test-retest reliability was strong between repeated gradings. The intraclass correlation coefficient of bladder trabeculation grades between fluoroscopic and cystoscopic images showed a moderate level of agreement.

Concluding message

A reliable grading system for bladder trabeculation using trabeculation depths and area covering the bladder surface may be useful for interpretation in patients with bladder outlet obstruction or neurogenic bladder.

Table 1. Distribution of VURs, urethral leaks, diverticula according to trabeculation grade

Grade	None	VUR	Urethral leak	Diverticulum	
0 (no)	51	8	5	1	65
1 (mild)	36	8	8	5	57
2 (moderate)	28	10	15	2	55
3 (severe)	14	16	20	1	51
	129	42	48	9	228

Table 2. Test-retest reliability of trabeculation grades over a period of 2 weeks

	Crohn's kappa	95% CI	P	Spearman's correlation coefficient (rho)	P
Reader 1	0.899	0.859-0.928	<0.001	0.814	<0.001
Reader 2	0.949	0.928-0.963	<0.001	0.888	<0.001
Reader 3	0.870	0.818-0.907	<0.001	0.774	<0.001
Reader 4	0.855	0.797-0.896	<0.001	0.757	<0.001
Reader 5	0.916	0.883-0.940	<0.001	0.853	<0.001
Reader 6	0.955	0.937-0.968	<0.001	0.904	<0.001
Reader 7	0.928	0.899-0.949	<0.001	0.855	<0.001
Reader 8	0.937	0.912-0.955	<0.001	0.887	<0.001
Reader 9	0.917	0.884-0.941	<0.001	0.851	<0.001

CI, confidence interval

Table 3. Correlation of trabeculation grades between fluoroscopic and cystoscopic images

	Intraclass correlation coefficient	95% CI	P
Reader 1	0.579	0.450-0.682	<0.001
Reader 2	0.599	0.477-0.698	<0.001
Reader 3	0.543	0.404-0.656	<0.001
Reader 4	0.589	0.464-0.690	<0.001
Reader 5	0.542	0.403-0.655	<0.001
Reader 6	0.630	0.518-0.721	<0.001
Reader 7	0.581	0.453-0.684	<0.001
Reader 8	0.579	0.452-0.683	<0.001
Reader 9	0.594	0.471-0.694	<0.001

References

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