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SACRAL RESECTION PATIENTS: A LONG-TERM NEED FOR UROLOGIC EVALUATION

Hypothesis / aims of study

Sacral resection is known to cause significant morbidity. Orthopedic and neurosurgical literature report bladder dysfunction up to 100% depending on the extent and level of resection. We sought to evaluate the treatment characteristics of the sacrectomy patients at our institution and the indicators of the need for long-term neuro-urologic monitoring.

Study design, materials and methods

We performed a retrospective analysis of all patients that underwent sacral resection/sacral cord manipulation at our institution from 6/2006 to 2/2016. The electronic medical records were reviewed for clinical data including age, date of surgery, type of lumbosacral (LS) resection, nerve and vertebral level of LS resection, histology of the sacral mass, urinary tract involvement, radiation therapy, postoperative urinary retention, need for postoperative catheter drainage, the most recent renal imaging and last creatinine level. Comparisons of categorical urinary outcomes among patient features were tested with Pearson's chi-square test. Creatinine levels were compared by the non-parametric Kruskal-Wallis test. All analyses were performed in SAS 9.3 (The SAS Institute Inc., Cary, NC). Figures were created in Stata 12.1 (StatCorp LP, College Station, TX).

Results

158 patients underwent sacrectomy of any type, with a median age of 50.5 (range, 12-82) years, most commonly with a pathologic diagnosis of sacral chordoma/chondrosarcoma [37%, n=58]. Median follow up was 27 months (0.5-109). The majority of patients (75%, n=118) had partial sacrectomy. Of the 67 S3 resections, 55% (n=37) were bilateral. Direct extension into urinary tract necessitating an intraoperative urology consultation occurred in 22 patients requiring ureterolysis, ureteral re-implant or cystectomy with urinary diversion (9). Of the 149 with an intact lower urinary tract, 63 (42%) patients had documented initial postoperative urinary retention. Prolonged catheterization (indwelling or intermittent) occurred in 65 (44%) patients. Urology was consulted for postoperative retention, urinary incontinence, gross hematuria, erectile dysfunction or hydronephrosis in 36 (24%) of the total cohort. Urologic intervention included ureteral stents (n=4), urodynamic testing (n=4), sacral neuromodulation (n=1), artificial urinary sphincter (n=1), cystolithalopaxy (n=1), medical management (n=4), continuation of CIC (n=6), ureteral reimplant (n=1), and secondary urinary diversion (n=1).

Unilateral nerve resection S3 and below was uniformly associated with immediate post-op retention ($p<0.001$). CIC dependence conformed to a similar pattern. No nerve resection levels were directly associated with hydronephrosis, but S3 showed a trend with 36% vs. 19% of patients with vs. without S3 involvement developing hydronephrosis ($p=0.08$). As expected, any S3 nerve involvement was characterized by increased in immediate post-op retention ($p=0.01$). Bilateral S3 nerve resection was characterized by retention and CIC dependence in 82% and 90% of patients, respectively, which was significantly increased over unilateral compromise.

Pelvic radiation was associated with lower post-op retention (31% vs. 50%; $p=0.03$) and increased hydronephrosis (35% vs. 12%; $p=0.01$). Since pelvic radiation was surprisingly associated with lower post-op retention, we explored differences in patient characteristics and treatment characteristics by radiation status, with a full table included in a supplemental table (Table S1). Of the 58 radiated patients, rectal adenocarcinoma was the primary in 25 (41%). Due to the difference in etiology and resection focus, patients with pelvic radiation were less likely to require S2, S3, S4, and S5 resection ($p=0.003$, 0.06, 0.03, and 0.004, and $p=0.01$, 0.23, 0.05, 0.01, right and left involvement, respectively). Therefore, there was a significant difference in sacral nerve involvement when comparing patients with and without radiation.

Direct or indirect upper tract imaging was obtained in 101 (64%) patients demonstrating new hydronephrosis in 24% of patients. One-third of patients (8) who developed hydronephrosis were already on intermittent catheterization. The relationship between post-operative retention, intermittent catheterization and hydronephrosis was examined. Immediate postoperative retention was not predictive of the development of hydronephrosis ($p=0.78$). Of the 24 patients who developed de novo hydronephrosis, 8 (33%) were documented to be on CIC for bladder management. Overall, hydronephrosis was equally likely regardless of CIC ($p=0.96$) (Table I)

Interpretation of results

Based on the presence of S3 involvement alone, almost half of our patient cohort would be predicted to have prolonged voiding dysfunction requiring evaluation and long-term monitoring. Initiation of appropriate intermittent catheterization along did not prevent the development of hydronephrosis indicating the need for neurourologic monitoring and management. Currently, post-sacrectomy post-operative follow-up does not integrate urologic consultation in all patients with expected urinary retention.

Concluding message

Our data has one of the largest series to date evaluating urologic outcomes of patients undergoing sacrectomy of any type with a respectable median follow-up of 27 months. However, the deficiencies are the retrospective nature of the study resulting in missing data points. We also found that a urologic specialist was consulted in only 36 patients (22.7%) despite many more showing evidence of long-term bladder dysfunction.. Overall, while the incomplete data is disconcerting, it highlights the opportunity for collaboration with the goal of improving the management of this patient population.

Table I. Hydronephrosis with CIC or Retention with Non-Missing Information

		Hydronephrosis				
		No		Yes		
Patient Characteristics		**N**	**(%)**	**N**	**(%)**	**P-value***
All		**77**	**(76%)**	**24**	**(24%)**	
Clean Intermittent Catheterization						0.96
	No	16	(80%)	4	(20%)	
	Yes	31	(79%)	8	(21%)	
	Missing	30	(71%)	12	(29%)	
Immediate Retention During Admission						0.78
	No	38	(79%)	10	(21%)	
	Yes	31	(82%)	7	(18%)	
	Missing	8	(53%)	7	(47%)	

* P-value is computed only for patients with non-missing information. However, missing retention information appears to be more highly associated with hydronephrosis.

References

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Disclosures

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