Urological consultation in patients with renal trauma can decrease rates of nephrectomies.

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Background

Renal trauma is implicated in up to 3.25% of trauma victims[1] and from 8-10% of abdominal trauma victims.[2] Urologists may or may not be consulted to assist in management. Convention has transitioned from an open surgery to more conservative management style if hemodynamic stability is present. Few studies show the impact of urologic consultation on behalf of renal trauma victims. We previously found significantly higher rates of conservative management and mortality benefits when urologists were consulted regardless of trauma grade. [3]

Aims

- Evaluate if urological consultation can improve outcomes in renal trauma patients
- evaluate for disparities in the incidence and care for individuals of varied ethnic backgrounds who suffer renal trauma.

Methods

Patients diagnosed with renal trauma who had measurable systolic blood pressure and pulse on admission to Denver Health Medical Center from January 2008 to July 2020 were retrospectively reviewed and included in the study. Patient characteristics and outcomes were compared between the groups. Urological consultation request was made according to the trauma team's discretion. Trauma grade was assigned based on AIS score as seen on CT scan or intraoperatively and ascertained in the operative report. Ordinal data was compared using chi-square tests and nominal data was compared using T-tests. Regression analysis for variation was used to control for patient differences in SBP, pulse, trauma grade, GCS, and ISS. Statistical significance was assigned to p-values <0.05.
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Figure 1: Patient Characteristics

	Overall n = 463	Urology Consultation n = 209	No Urology Consultation n = 254	P-Value
Age – years	34.6 (±16.3)	35.4 (±16.0)	34.0 (±16.5)	0.357
Sex - M/F (% male)	362/101 (78.2%)	172/31 (82.2%)	190/64 (74.8%)	0.009
Ethnicity – n (%)				
White	245 (52.9%)	107 (51.2%)	138 (54.3%)	0.501
Hispanic	149 (32.2%)	70 (33.5%)	79 (31.1%)	0.584
Black	42 (9.1%)	20 (9.6%)	22 (8.7%)	0.735
Other	27 (5.8%)	12 (5.7%)	15 (5.9%)	0.940
Mechanism – n (%)				
Blunt Penetrating	405 (87.5%) 58 (12.5%)	190 (90.9%) 19 (9.1%)	215 (84.7%) 39 (16.9%)	0.042
Outcome – Lived/Died	423/40 (91.4%)	204/5 (97.6%)	219/35 (86.2%)	<0.001
Nephrectomy	34 (7.3%)	14 (6.7%)	20 (7.9%)	0.629
AIS Score				
Grade 1	24 (5.2%)	9 (4.3%)	15 (5.9%)	0.440
Grade 2	169 (36.6%)	43 (20.6%)	126 (49.6%)	<0.001
Grade 3	141 (30.5%)	71 (34%)	70 (27.6%)	0.136
Grade 4	94 (20.3%)	74 (35.1%)	20 (7.9%)	<0.001
Grade 5	34 (7.4%)	12 (5.7%)	22 (8.7%)	0.231

Figure 2: Mortality by Consultation Status

	Lived	Died	p-value
SBP≤90 Urology Consult No Urology Consult	 20 33	 2 12	0.096
Pulse ≥100 Urology Consult No Urology Consult	 68 124	 3 16	0.084
ISS ≥27 Urology Consult No Urology Consult	 77 88	 5 32	<0.001
GCS 3-8 Urology Consult No Urology Consult	 27 33	 4 28	0.002
AIS 4-5 Renal Trauma Urology Consult No Urology Consult	 85 36	 2 6	0.008

Figure 3: Subgroup Analysis of nephrectomy patients

Overall Contributors to nephrectomy

	Nephrectomy (n=34)	No Nephrectomy (n=429)	p-value
SBP ≤90 SBP >90	12 (35%) 22 (65%)	55 (13%) 365 (87%)	<0.001
Pulse ≥100 Pulse <100	21 (62%) 13 (38%)	192 (46%) 226 (54%)	0.075
AIS 1-3 Trauma AIS 4-5 Trauma	1 (3%) 33 (97%)	333 (78%) 96 (22%)	<0.001

Nephrectomy rate by consultation status

	Nephrectomy (n=23)	No Nephrectomy (n=96)	p-value
Urology Consult No Urology Consult	13 (57%) 20 (43%)	74 (77%) 22 (23%)	<0.001

Nephrectomy rate by timing of consultation

	Timely (n=82)	Late (n=63)	p-value
No Nephrectomy	70	41	0.004
Nephrectomy	5	22	
Partial Nephrectomy	7	0	

Figure 4: Subgroup analysis of patient ethnicity

Mechanism of Injury by ethnicity

	Blunt (n=405)	Penetrating (n=58)	p-value
White	232 (95%)	13 (5%)	<0.001
Hispanic	124 (83%)	25 (17%)	
Black	27 (64%)	15 (36%)	
Other	22 (81%)	5 (19%)	

AIS Grade 1-3 Renal Trauma: Consultation status by ethnicity

	Urology Consult	No Urology Consult	p-value
White Minority	59 63	124 88	0.073

AIS Grade 4-5 Renal Trauma: Consultation status by ethnicity

	Urology Consult	No Urology Consult	p-value
White Minority	48 39	14 28	0.020

Discussion

We found that even after controlling for shock, tachycardia, AIS, and ISS, survival rate is significantly higher when urology is involved in patient care. Our study shows that patients in the urological consultation group who had sustained high grade renal trauma not only underwent nephrectomy significantly less often, but also had a significant mortality benefit. In patients who did undergo removal of renal tissue, pre-operative or intraoperative urology consultation more often resulted in nephron sparing techniques. Half of such cases in our series resulted in partial nephrectomy and no partial nephrectomies occurred in the no consultation group.

Our study did not find ethnicity to have any significant bearing *overall* on whether urology was consulted. White patients received consultation for grade 4-5 trauma 77% of the time, but that was considerably lower for Hispanic patients (63%), black patients (46%), and those who identified as "other" (50%). Minorities sustained significantly more penetrating trauma when compared to white patients. Furthermore, only 33% of penetrating trauma victims received consultation compared to blunt trauma. Fortunately, analysis did not show differences in consultation rates for blunt or penetrating trauma respectively with regards to ethnicity.

Conclusion

We have demonstrated that urologic consultation in the event of high-grade renal trauma leads to improved patient care with increased survival, decreased overall nephrectomy rate, and increased nephron sparing techniques. These significant benefits show the importance of the multidisciplinary and generally conservative approach to the management of renal trauma.

References

1. Erlich T, Kitrey ND. Renal trauma: The current best practice. Ther Adv Urol. 2018;10(10):295–303.
2. Santucci RA, Fisher MB. The literature increasingly supports expectant (conservative) management of renal trauma--a systematic review. *J Trauma*. 2005;59(2):493-503. doi:10.1097/01.ta.0000179956.55078.c0
3. Rodrigo Donalisio da Silva, Diedra Gustafson, Leticia Nogueira, Wilson R. Molina, Fernando J. Kim. Urology Consultation Can Improve Survival Rates In Renal Trauma Patients. *The Journal of Urology* Vol 193, Issue 4, Supplement, April 2015, Pages e210-e211

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