

Management of Renal Traumas and Follow-up Results: Single Center Experience

Renal Travmaya Yaklaşım ve Takip Sonuçları: Tek Merkez Deneyimi

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Abstract

Objectives: Kidney traumas constitute a small part of all abdominal traumas. There is debate about whether to choose a conservative or surgical approach. Nephrectomy is the most common surgical treatment for renal trauma. Conservative treatment may be considered for preservation of renal function. Fourth and fifth degree injuries are associated with poor functional outcomes.

Materials and Methods: Kidney trauma admitted to a third-degree reference center was evaluated. Renal trauma assessment was performed with the help of computed tomography. Age, gender, laterality, and hemoglobin levels were evaluated. cases that were followed conservatively and underwent surgery were recorded.

Results: The median age of the patients was 25 years (18-44 years). 71.4% (n=15) of the cases were conservatively managed. Surgical repair of the injured kidney was preferred for 1 of the cases (4.8%). Nephrectomy was performed for 2 cases (9.5%) and embolization was preferred 2 cases (9.5%). Surgical repair and removal of foreign body was performed for only 1 case with penetrating renal trauma (4.8%). All grade I and II traumas were treated conservatively. One of grade III traumas underwent surgical repair, 1 of them underwent surgical repair and removal of foreign body and the other 4 patients were treated conservatively. One of grade IV traumas was performed nephrectomy, 1 of them underwent embolization and the other 4 were conservatively treated. For the patients with grade V traumas, 1 underwent nephrectomy and 1 was treated with embolization.

Conclusion: Different success rates have been reported for treatment approaches according to the literature. Both treatments have advantages and disadvantages. Conservative treatment is at the forefront in many patients, albeit at a high level. Interventions should be planned for hemodynamically unstable patients. This approach seems beneficial given its efficacy and safety. Thus, unnecessary kidney loss will be prevented.

Key Words: Renal Trauma, Nephrectomy, Conservative

Öz

Amaç: Böbrek travmaları tüm karın travmalarının küçük bir kısmını oluşturur. Konservatif mi yoksa cerrahi yaklaşım mı tercih edileceği konusunda tartışmalar vardır. Nefrektomi, renal travmanın en yaygın cerrahi tedavisidir. Konservatif tedavi böbrek fonksiyonunun korunması için düşünülebilir. Dört ve beşinci derece yaralanmalar kötü fonksiyonel sonuçlarla birlikte beraberliği mevcuttur.

Gereç ve Yöntem: Üçüncü derece referans merkezine kabul edilen böbrek travmaları değerlendirildi. Renal travma değerlendirmesi bilgisayarlı tomografi yardımı ile yapıldı. Yaş, cinsiyet, lateralite, hemoglobin seviyeleri değerlendirildi. Konservatif takip edilen ve cerrahi uygulanan olgular kaydedildi.

Bulgular: Hastaların medyan yaşı 25 (18-44 yıl) olarak saptandı. Olguların %71,4'ü (n=15) konservatif olarak takip edildi. Yaralanan böbreğin cerrahi onarımı olguların 1'inde (%4,8) tercih edildi. İki olguya (%9,5) nefrektomi yapıldı ve 2 olguya (%9,5) embolizasyon tercih edildi. Penetran renal travmalı sadece 1 olguda (%4,8) cerrahi onarım ve yabancı cisim çıkarıldı.

Sonuç: Literatüre göre tedavi yaklaşımları için farklı başarı oranları bildirilmiştir. Her iki tedavinin de avantajları ve dezavantajları vardır. Konservatif tedavi, yüksek dereceli de olsa birçok hastada ön plandadır. Hemodinamik açıdan stabil olmayan hastalar için müdahaleler planlanmalıdır. Bu yaklaşım, etkinliği ve güvenliği göz önüne alındığında faydalı görünmektedir. Böylelikle gereksiz böbrek kaybı önlenmiş olacaktır.

Anahtar Kelimeler: Renal Travma, Nefrektomi, İzlem

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Introduction

Renal traumas are not common trauma types that constitutes 1-5% of all traumas and 10% of abdominal traumas (1). There is a controversy of preferring conservative or surgical approach for the treatment of renal traumas (2). Experiences revealed lower nephrectomy and complication rates (2). Conservative management is a standart approach for low-grade traumas (1). During the last decade conservative approach replaced the surgical interventions (3). In case presentations, it has been shown that conservative approach would be preferred for also grade V renal traumas (4). During the conservative management some cases would be undergone for nephrectomy. Studies revealed that conservative approach would be also preferred for every grade of renal trauma for pediatric patients (5). Surgical exploration of renal traumas mostly result with nephrectomy (6). Trauma management depends on the parenchymal injury and risk of bleeding (7). Urinary extravasation accounts for 30% of all complications and immediate or delayed ureteral stenting is the main treatment of this condition (7).

Urinary extravasation would be managed by both observation and ureteral stenting (8). Time to excretory phase is an important point for the accurate diagnosis of collecting system injury (9). The percentage of the need to image for surgical intervention is approximately 12.5% in asymptomatic patients with high-grade renal trauma (10). It was found that most of the practitioners were intended to preserve renal functions while managing high-grade renal traumas (11). They were observed as comfortable with renorrhaphy and they have access to interventional radiology (12). Conservative management would be considered for renal function preservation and while assessing the functional outcomes, poor functional outcomes were found for grade V and specific subtypes of grade IV injuries (12). Hypotension at hospital admission, hematoma size greater than 3.5 cm, blood transfusion during the follow-up and worsening of injuries with computerised tomography are the predictive factors of conservative approach failure (6). In this study, we aimed to evaluate the patients that have been evaluated and treated in our clinic. Also we aimed to show the efficacy of conservative treatment for especially stable patients.

Materials and Methods

Renal traumas that were admitted to University of Health Sciences Turkey, Gülhane Training and Research Hospital, Clinic of Urology between January 2016 and June 2020 have been included in our study. Age, gender, laterality and grade of renal trauma, presence of foreign body, presence of macroscopic hematuria, complete blood count and biochemistry results during admission, on first and seventh day of hospital stay,

presence of accompanying disease and treatment approaches were noted. Grades of renal traumas were evaluated with computerised tomography. Patients were hospitalised and observed with bed rest. Routine vital signs were observed during the hospital stay. Conservative and surgical approaches were chosen for the patients and both of the treatment modalities and the results of treatments were evaluated in detail.

Statistical Analysis

Statistical analysis was conducted with using Statistical Package for Social Sciences 22.0 software (SPSS 22.0 for MAC). Descriptive statistics of nominal samples were expressed with numbers and percentiles. Descriptive statistics of scale samples were expressed as mean or median according to their normalization. The frequency of the collected data has been also analyzed in detail. Shapiro-Wilk test was used to assess the variables' normalization. Spearman's correlation analysis was used to assess the correlation between the trauma grade and some of the noted variables that are the important factors for renal trauma. The value of $p < 0.05$ was accepted as statistically significant.

Results

The study is a retrospective study and ethical approval was obtained from University of Health Sciences Turkey, Gülhane Training and Research Hospital (approval no: 2021-70, date: 11.02.2021). Twenty one patients have been admitted to our clinic with renal trauma between January 2016 and June 2020. All of these patients were male. The median age of the patients was 25 years (18-44 years). While assessing the laterality, 42.9% of the traumas were observed in left kidney (n=9) and 57.1% of them were in right kidney (n=12). Foreign bodies were observed in 57.1% of the renal traumas (n=12) and among these patients 4.8% of them were seen in left kidney (n=1), 28.6% of them were seen in right kidney (n=6), 9.5% were in right retroperitoneal area (n=2), 9.5% of them were in left retroperitoneal area (n=2) and 4.8% of them were in both right kidney and right retroperitoneal area (n=1). The number of foreign bodies were noted as; 1:38.1%, 2:9.5%, 3:4.8% and 4:4.8%. Mean size of these foreign bodies was 6.75 mm. While assessing the grades of renal traumas; grade 1: 5 patients (23.8%), grade 2: 2 patients (9.5%), grade 3: 6 patients (28.6%), grade 4: 6 patients (28.6%) and grade 5: 2 patients (9.5%). Macroscopic hematuria was observed in 57.1% of the patients and most of them were observed in high-grade renal traumas ($p < 0.05$). There was strong positive correlation between the increase in trauma grade and the presence of macroscopic hematuria ($Rho = 0.696$; $p < 0.01$). Mean hemoglobin level at admission was 14.1 g/dL, it was 11.6 g/dL on first day 12.3 d/dL on 7th day and 12.9 g/dL on 30th day. Mean hemoglobin drop between the first day of stay and admission was 2.3 g/dL (0.3-6.8 g/dL). It was 1.8 g/dL

between the 7th day of hospital stay and admission and 1.04 g/dL between 30th day and admission. The differences between the creatinine values were not statistically significant and the values were similar between admission, first, 7th and 30th days. While assessing the correlation between trauma grade and hemoglobin drop at first, 7th and 30th day, it was found that there was not a statistically significant correlation (Rho=-0.224; p>0.05, Rho=-0.074; p>0.05 and Rho=0.029; p>0.05 respectively). The treatment approaches were also evaluated in detail. 71.4% of the cases were conservatively managed (n=15). Surgical repair of the injured kidney was preferred for 1 of the cases (4.8%). Nephrectomy was performed for 2 cases (9.5%) and embolization was preferred 2 cases (9.5%). Surgical repair and removal of foreign body was performed for only 1 case with penetrating renal trauma (4.8%). All grade I and II traumas were treated conservatively. One of grade III traumas underwent surgical repair, 1 of them underwent surgical repair and removal of foreign body and the other 4 patients were treated conservatively. One of grade IV traumas was performed nephrectomy, 1 of them underwent embolization and the other 4 were conservatively treated. For the patients with grade V traumas, 1 underwent nephrectomy and 1 was treated with embolization (Table 1).

Discussion

Renal traumas would be seen as blunt or penetrating traumas and they could be managed with conservative or surgical approaches. Many studies in the literature showed different success rates for these treatment approaches. Studies have shown that even high grade traumas of pediatric age group would be treated with conservative option (13). Regardless of injury details, nephrectomy rates have decreased consistently (14). There are some complications that would be seen with conservative approach. There is a risk of urinoma and the treatment of urinoma is still controversial as both percutaneous drainage and ureteral stent placement options would be preferred (15). Delayed surgical exploration would also cause secondary hemorrhage and urinary extravasation (16). On the other hand early surgical approaches would result with high renal loss (16). When evaluating the preferred treatment options, it is obvious to see that even in the high grade traumas, initial conservative approach is advocated

(17). Studies reported the successful outcomes of conservative approaches even for grade V traumas (4).

Studies also showed the efficacy of percutaneous embolization for hemodynamically unstable patients with grade V trauma (18). Results show this technique as a safe option with no intermediate-term adverse events (18). A study with large number of cases showed that clinical findings were the best guides for management and when managing the traumas it was not recommended to consider only the radiologic findings (19). While evaluating the cases with renal traumas that were treated in our center, it is clearly seen that most of the cases were treated conservatively. The cases in our center were all male. All the cases with grade I and II renal traumas were treated conservatively. Six patients with higher grades needed intervention and only 2 patients underwent nephrectomy. Our study results were compatible with the literature and as the studies reported in the literature, tendency for conservative approach is increasing recently. When considering the manuscripts in the literature, it is obvious that guidelines for renal trauma treatment must be revised and the conservative approach indications would be widened. Especially hemodynamically stable patients would be followed with close observation and monitorization. As it was seen in our study, hemoglobin drop was decreased with the days of observation and there was not significant creatinine change. These findings also support the efficacy of conservative approach for avoiding unnecessary renal loss.

Study Limitations

Our study has been conducted with limited number of cases. More cases and multicentric studies would contribute the literature and also they would be necessary for updating the guidelines.

Conclusion

Most of the patients with renal traumas, even if they are high grades, would be treated conservatively. Interventions must be considered for only hemodynamically unstable patients. This approach would be useful when considering the efficacy and safety. Also unnecessary renal loss would be avoided.

Table 1: Renal trauma grades and treatment options

Renal trauma grade	Conservative treatment	Embolization	Surgical repair	Surgical repair+foreign body removal	Nephrectomy
I	5 (23.8%)				
II	2 (9.5%)				
III	4 (19%)		1 (4.8%)	1 (4.8%)	
IV	4 (19%)	1 (4.8%)			1 (4.8%)
V		1 (4.8%)			1 (4.8%)

Ethics

Ethics Committee Approval: Ethical approval was obtained from University of Health Sciences Turkey, Gülhane Training and Research Hospital (2021-70).

Informed Consent: The study is a retrospective study.

Peer-reviewed: Externally peer-reviewed.

Authorship Contributions

Concept: C.Ö., S.S., C.A., B.T., S.B., Design: C.Ö., S.S., C.A., B.T., S.B., Data Collection and Processing: C.Ö., S.S., C.A., B.T., S.B., Analysis or Interpretation: C.Ö., S.S., C.A., B.T., S.B., Literature Search: C.Ö., S.S., C.A., B.T., S.B., Writing: C.Ö., S.S., C.A., B.T., S.B.

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