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Research Article

IMAGING ROLE IN THE PREDICTION OF KIDNEY'S SALVAGE-ABILITY IN TUBERCULOSIS OF URINARY TRACT

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Abstract:

Objective: The main objective of this research work was to examine the imaging role in the prediction of kidney's salvage-ability and the early nephrectomy's role in urinary tract TB (Tuberculosis).

Methodology: This research work comprised on 103 patients who were administered from 2012 to 2020. We reviewed the IVUs (Intravenous Urograms). Stratification of the patients was carried out in 3 different groups. Treatment comprised of immediate surgical intervention, described as nephrectomy within 6 weeks of the start of ATT (Anti-TB) therapy and delayed nephrectomy was performed after completing ATT. We applied the Chi square test for acknowledgement of the importance of early nephrectomy. We used the logistic regression analysis for the identification of the factors to predict the salvage-ability of the nephrons.

Results: Out of total 103 patients, twenty-three patients were present with early nephrectomy and all patients got complete cure and found with good renal function at follow-up period. Of seventy-six patients who obtained only the ATT, forty-three patients got complete cure and remaining thirty-three patients were deteriorated symptomatically with increase in level of serum creatinine and reduction in GFR. Among thirty-three deteriorated patients, we noticed deterioration in radiological & biochemical findings in twenty-four patients, there was development of flank sinus in 2 patients and there was development of multi-drug resistant tuberculosis. On sub-division of the subjects on the basis of IVUs, it was discovered that those patients with major renal abrasion alone (Group-A) or with involvement of bladder (Group-C) needed either delayed or early nephrectomy and patients present with minor abrasions (Group-B) or involvement of bladder without or with minor abrasions (Group-C) did optimum on ATT. Model of logistic regression stated cavity abrasion, GFR of less than 20.0ml/min/m² and statistically significant unfavorable factor was gross hydro-nephrosis and favorable factor was ureteric stricture.

Conclusion: In this modern period of ATT, one of the essential methods is nephrectomy. The findings of this research work recommend the application of early nephrectomy for the patients present with major renal abrasions without or with the involvement of bladder, gross hydro-nephrosis and for those patients who are present with GFR of less than 20.0ml/min/m².

Keywords: GFR, ATT, bladder, gross, nephrosis, regression, analysis, nephrectomy, abrasions.

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INTRODUCTION:

TB of urinary system is the 2nd most common pulmonary TB constituting 10.0% to 20.0% of patients in the countries which are under development [1]. In Europe, urinary TB constitutes 30.0% of pulmonary TB [2]. Regardless of the excellent chemotherapy, TB has become most important reason of mortality from different infectious diseases in the whole world particularly with the rise in the incidence of HIV [3]. Opposite to the other types of TB, TB of urinary tract poses considerable problem's management. Surgery is the vital tool in managing the advanced abrasions of the urinary tract [4]. Nephrectomy's role in this modern era of ATT (Anti-TB Treatment) is still controversial. There is variation in the rate of incidence of nephrectomy from 15.0% to 62.0% in various series [5, 6]. Surveillance role while on anti-TB treatment and requirement for PCN or stenting salvage-ability are deliberated [7, 8].

The role played by the initial imaging in the prediction of the clinical course is not well talked in this particular literature. This current research work tries to address whether the prediction of salvage-ability is possible with initial imaging and as well as role initial imaging to evaluate the outcome of the clinical treatment and counsel of the patients about the procedures of success of salvage.

METHODOLOGY:

This is a retrograde analysis of 103 patients in Nishter Hospital Multan from 2012 to 2020. We evaluated all the patients with elaborate history, clinical examination, complete count of blood, ESR,

culture of urine, X ray of chest and imaging. We collected 3 consecutive early morning samples of urine for culture of the mycobacterium. We used ultrasound for the quantification of the renal cortical thickness and we also conducted 99mTc DTPA scanning the assessment of baseline GFR. We reviewed the IVUs. We decided the plan if the stratification of the findings of IVU at presentation could identify the clinical outcome. In addition, with this, all the patients had to undergo biopsy of bladder and cystoscopy.

On IVU review, the stratification of the patients could be carried out into 3 groups. Group-A consisted the calcified kidney, kidney with no functioning, hydro-nephrotic kidney with PUJ stricture. Their classification was carried out under the major renal abrasion. The patients with ureteric narrowing of mild degree were included in Group-B. All the patients with the involvement of bladder without or with the major renal abrasion were present in Group-C. Therapy comprised the immediate surgery, described as the nephrectomy within 6 weeks of initiation of ATT and delayed treatment was the surgery as nephrectomy conducted after fulfillment of ATT. We applied the Chi square test to determine the importance of the early nephrectomy. We used the model of logistic regression analysis for the determination of the factors predicting salvage-ability of mass of nephron and to measure the system of scoring if possible.

RESULTS:

Out of 103 patients, twenty-three patients underwent immediate surgical intervention as nephrectomy in 6 weeks of start of ATT.

Table 1. Comparison of Anti-Tuberculosis Treatment (ATT) Alone with Combination Of Immediate Nephrectomy and ATT.

	Cured	Worsened	Total
Immediate nephrectomy + ATT (I)	27	0	27
ATT alone (II)	43	33	76
Total	70	33	103

All of the patients obtained cure and they were present with good renal functionality at follow-up. Of seventy-six patients who received only anti-TB treatment, forty-three patients got cure and thirty-three patients deteriorated symptomatically with much high level of serum creatinine and decrease

level of GFR. Of these thirty-three patients, twenty-four patients were present with radiological as well biochemical deterioration, there was development of flank sinus in 2 patients and one patient was present with multi-drug resistant TB.

Table 2. Outcome of Renal Units Based on Initial Features on Imaging (IVU).

Groups	Cured		Required Surgery	
	I (%)	II (%)	I (%)	II (%)
Group A (n = 25)	14 (56)	0	0	11 (44)
Group B (n = 12)	4 (33.3)	4 (33.3)	0	4 (33.3)
Group C (n = 66)	9 (13.6)	39 (59.1)	0	18 (27.3)
Total (n=103)	27	43	0	33

We analyzed the results further after classification of the patients into groups A, B and C according to the initial findings of IVU. Of the twenty-five patients in Group-A, 56.0% (n: 14) patients underwent immediate surgery and cured, while 44.0% (n: 11) patients who got ATT alone stated the deterioration in renal functionality and they were in need of nephrectomy. In Group-B, 4 patients who underwent immediate nephrectomy with anti-TB treatment got cure. Of the 8 patients in Group-B, 3 patients were present with the ureteric dilation with anti-TB treatment and five patients were present with ATT alone. Single patient in former and 3 patients in latter needed nephrectomy. In Group-C, all 9 patients who

underwent immediate nephrectomy in addition with ATT got complete cure whereas eighteen out of thirty-nine patients who obtained ATT alone needed immediate surgery. Regardless of a particular group, patients who underwent immediate surgical intervention in combination with ATT did much well and all these patients were present with stable renal functionality. Most of the patients who received ATT alone required the delayed nephrectomy showing early surgical intervention. Model of logistic regression analysis displayed the cavitory abrasions, GFR of less than 20.0 ml/min/m² and gross hydronephrosis as significant unfavorable risk factors and ureteric stricture as favorable risk factor statistically.

Table 3. Univariate Analysis Showing Favourable and Unfavourable Factors.

Factors	Improved	Worsened	p value
Cavitation's	1	6	0.01
Ureteric stricture	24	11	0.002
GFR <20ml/min/m ²	0	6	0.03
Gross hydronephrosis	1	9	0.001
Infundibular stricture	2	2	0.86
PUJ stricture	1	2	0.55
Bladder involvement	1	2	0.55
Multiple sites	2	5	0.1
Mean serum creatinine	1.62	1.12	0.07

DISCUSSION:

Regardless of the modern ATT, surgical intervention is the essential option for the preserve the deterioration in the renal functionality and as nephrectomy for NFK (Non-Functioning Kidney). Conventionally, nephrectomy for non-functioning kidneys is reserved for malignancy, bleeding, intractable pain or chemotherapy failure [9]. There is no recommendation of the routine nephrectomy for each NFK [10]. Some authors believed that nephrectomy is a beneficial procedure in NFK as it decreased the total duration of ATT, reduced the danger of urinary fistula and it also decreased the requirement of anti-hypertensive therapy [11]. There is an increase in the rate of incidence of TB of

urinary tract, but the prevalence of nephrectomy has reduced over years and its variation is from 15.0% to 62.0% [5, 6]. But in this current research work, its percentage was 58.20. In a research work on 28 NFKs [11], only 3 patients salvaged and there was requirement of nephrectomy in the remaining patients.

Kerr [12] investigated the dynamics of kidney's progression and filed their outcomes in an effort to arrest the process of pathology by means of surgeries. One other research work [13] separated the patients into three different groups; group with clinical treatment alone, clinical therapy with the ablative method and clinical therapy followed by the

reconstructive method. Of ninety-two patients, 45.0% (n: 41) needed nephrectomy in first 30 or 60 days of the initiation of ATT. This research work stressed the nephrectomy's role but there was no discussion on the features of imaging prompting the particular imaging.

Imaging is much vital for the prediction as well as diagnosis of the severity of the process of disease. Some of the systems of staging based on the imaging as Semb's staging has been proposed to predict the renal salvage-ability [14]. In the same manner, there is some utilization of Elke's staging [15] to find out the utilization for the secondary nephrectomy. In one other retrograde research work of 41 renal units [8], 10 had nephrectomy & 8 of 15 who were present with PCN for salvaging the renal functionality subsequently needed nephrectomy. Authors stated that renal involvement of low grade, GFR greater than 15.0ml/min/m² and less ureteric stricture were the essential factors for the recovery of renal function [8]. Patients present with adverse function of kidneys at onset, with GFR less than 20.0 ml/min/m² with radiological aspects of renal involvement will be improved off with the nephrectomy. This will also prevent the morbidity of stenting or the nephrostomy. Skutil & Obstnik [16] gave the recommendation of early nephrectomy for persistent TB cystitis and O'Flynn [17] emphasized that decision to perform the nephrectomy based on the extent of renal abrasion. Our findings showed that nephrectomy is vital for major abrasions with the involvement of bladder. When there is involvement of bladder alone or in combination with the ureteric stricture or renal abrasion, therapy with the anti-tubercular drugs gets better response and there should be avoidance to the complex methods like augmentation.

CONCLUSION:

In modern ATT era, one of the essential methods is nephrectomy. The findings of this research work conclude that early nephrectomy for the case suffering from major renal abrasion without or with involvement of bladder, gross hydro-nephrosis and having GFR of less than 20.0ml/min/m². The favorable factors are less ureteric strictures and renal units with GFR greater than 20.0ml/min/m² and salvage methods are much beneficial in such patients.

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