



Research Article

**DIAGNOSIS AND MANAGEMENT OF GENITOURINARY TUBERCULOSIS:  
AN INSTITUTIONAL EXPERIENCE**

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**ABSTRACT**

**Introduction:** Genito-urinary Tuberculosis (GUTB) has been found to occur in 15-20% of the patients who have ever contracted Pulmonary Tuberculosis in their lifetime. 90% of GUTB cases are seen in developing countries. GUTB is the second most common extra-pulmonary Tuberculosis, lymph node TB being the most common. GUTB continues to be a significant clinical problem because of its non specific clinical presentation and variable radiological appearance. Patients with advanced urogenital TB also present with very few symptoms, thus making it more difficult to anticipate and manage.

**Material and Methods:** Our study population comprised of 75 patients who were diagnosed with GUTB, and admitted in our tertiary care hospital from Sept 2018 to Feb 2021. A thorough clinical evaluation was supplemented by microbiological evaluation such as urine evaluation for Acid Fast Bacilli, urine culture and sensitivity, Cartridge Based Nucleic Acid Amplification Test (CBNAAT) and radiological evaluation of kidneys, ureters and bladder with the help of ultrasonography, Intravenous Pyelography, Computed Tomography scans and Magnetic Resonance Urography.

**Results:** Most patients with GUTB were found to be in the 3<sup>rd</sup> and 4<sup>th</sup> decades of life, with mean age being 38.6 years. Amongst the patients evaluated in our study, a male sex predominance was found to be there with 48 males and 27 females. Among symptoms, most common symptoms were storage symptoms such as increased frequency of micturition seen in 80%cases, urgency in 77%cases, dysuria in 73% cases and so on. CT Urogram changes were seen in 86% and IVP changes were noted in approximately 70% patients. In this report, we have compiled our collection of exclusive images obtained from our study population, that helped to build a conclusive diagnosis of GUTB in our patients.

**Conclusion:** Genitourinary tuberculosis remains a major health problem in developing countries. GUTB can involve any part of the genitourinary system. Diagnosis is usually delayed due to nonspecific symptoms and variable radiological appearance. Early changes can be seen on intravenous pyelogram and computed tomography. Immediate stenting and medical management is the mainstay of GUTB treatment. Long term follow up is required after reconstructive surgeries.

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**INTRODUCTION**

The term Genito-urinary Tuberculosis (GUTB) was coined by Wild Bolz in the year 1937<sup>1</sup> and has been found to occur in 15-20% of the patients who have ever contracted Pulmonary Tuberculosis in their lifetime. 90% of GUTB cases are seen in developing countries.<sup>2</sup> GUTB is the second most common extra-pulmonary Tuberculosis, lymph node TB being the most common.<sup>3</sup> GUTB continues to be a significant clinical problem because of its non specific clinical presentation and variable radiological appearance.<sup>4</sup> Patients with advanced urogenital TB also present with very few symptoms, thus making it more difficult to anticipate and manage.<sup>5</sup> The problem however is grave, as missed or untreated GUTB can lead to irreparable tissue damage and life threatening consequences such as renal failure.<sup>6</sup>

In the present article, we share our institutional experience of 75 patients of GUTB, with special emphasis on the difficulty in diagnosing and managing the cases of GUTB.

**MATERIAL AND METHODS**

Our study population comprised of 75 patients who were diagnosed with GUTB, and admitted in our tertiary care hospital from Sept 2018 to Feb 2021. A thorough clinical evaluation was supplemented by microbiological evaluation such as urine evaluation for Acid Fast Bacilli, urine culture and sensitivity, Cartridge Based Nucleic Acid Amplification Test (CBNAAT) and radiological evaluation of kidneys, ureters and bladder with the help of ultrasonography, Intravenous Pyelography, Computed Tomography scans and Magnetic Resonance Urography. The patients were managed medically with anti-tubercular drugs and surgically with both ablative and reconstructive procedures depending upon the patient's profile.

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**RESULTS**

Most patients with GUTB were found to be in the 3<sup>rd</sup> and 4<sup>th</sup> decades of life, with mean age being 38.6 years. Frequency distribution of ages is mentioned in Table 1.

**Table 1** Frequency distribution of ages.

Age Group	Patients
20-30	6
30-40	54
40-50	12
50-60	3

Amongst the patients evaluated in our study, a male sex predominance was found to be there with 48 males and 27 females in all.

Upon evaluating symptomatology, it was found that majority patients presented with storage symptoms with frequency distribution as mentioned in Table No 2.

**Table 2** Frequency distribution of symptoms

Symptoms	Number of Patients	Percentage
Dysuria	55	73.3%
Increased Frequency	60	80%
Urgency	58	77.3%
Poor Stream	20	26.6%
Strain to Void	20	26.6%
Abdominal Pain	51	68%
Hematuria	18	24%
Constitutional Symptoms	30	40%
Recurrent Urinary Tract Infection	20	26.6%
Infertility	3	4%
Previous History Of Tb	22	29.3%

The investigations that the patients were subjected to, and the changes noticed in them are tabulated in Table 3.

**Table 3** Frequency distribution of investigations

Investigation	Number of Patients	Percentage
Raised ESR	40	53.3%
Urine AFB Seen	20	26.6%
CT Urogram Changes	65	86.6%
IVP Changes	52	69.3%
MRI Changes	3	4%
Cbnaat	15	20%

We present our collection of exclusive images obtained from our study population, that helped to build a conclusive diagnosis of GUTB in these patients.

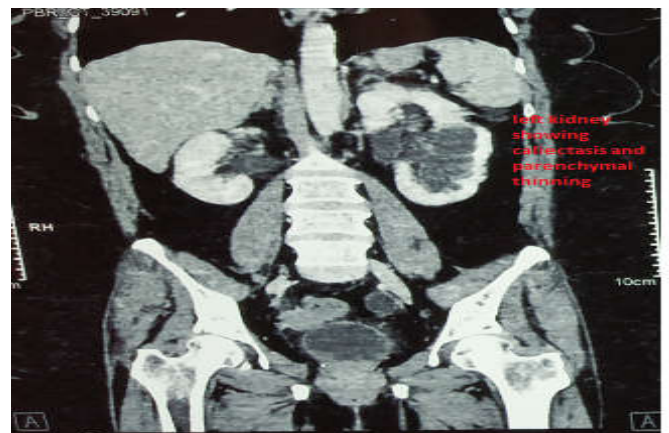
**CT changes seen in our patients suggestive of genitourinary TB**



(a) axial cut section showing calcified granuloma in lower pole of left kidney



(b) CT urogram showing non functioning left kidney with lower pole calcified granuloma



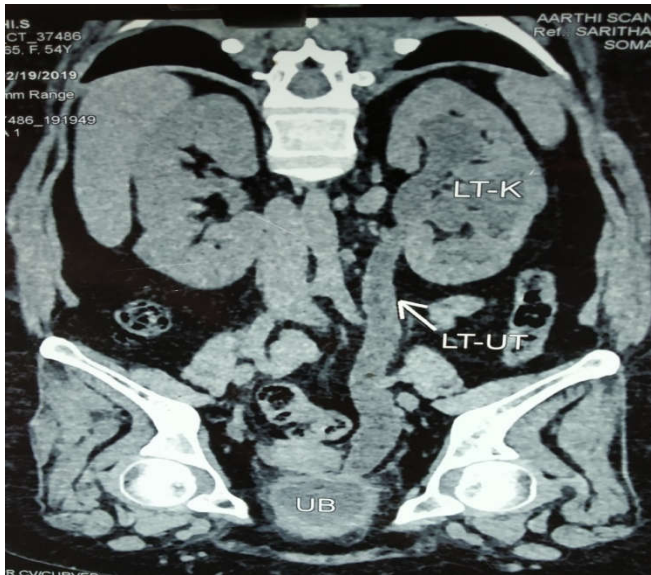
(c) coronal cut section showing caliectasis and parenchymal thinning



(d) axial CT showing assymmetric calyceal dilatation



(e) axial section of CT showing right asymmetric calyceal dilatation with parenchymal thinning



(f) coronal cut section of CT showing dilated thickened ureter with periureteric changes .bladder wall is thickened with reduced bladder capacity

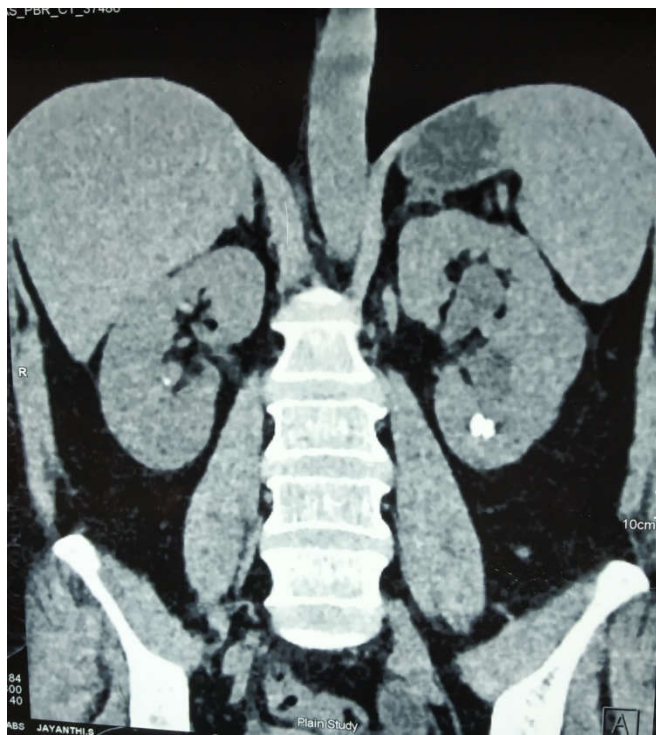


(i) axial cut section of CT (pelvis) showing thickened bladder with reduced capacity

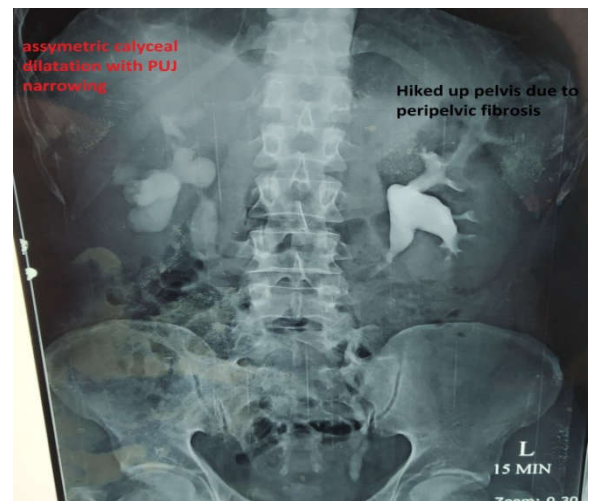
**Intravenous Pyelogram changes in our patients suggestive of GUTB**



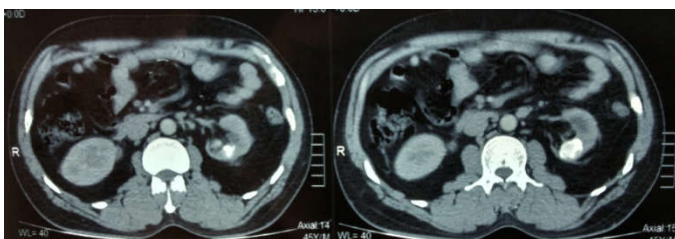
(a) IVP showing earliest changes of fuzzy, feathery and moth eaten calyx



(g) Coronal section of CT showing parenchymal calcification in left kidney



(b) IVP showing assymetriccalyceal dilatation with pelviureteric junction narrowing on right side with hiked up pelvis on left side



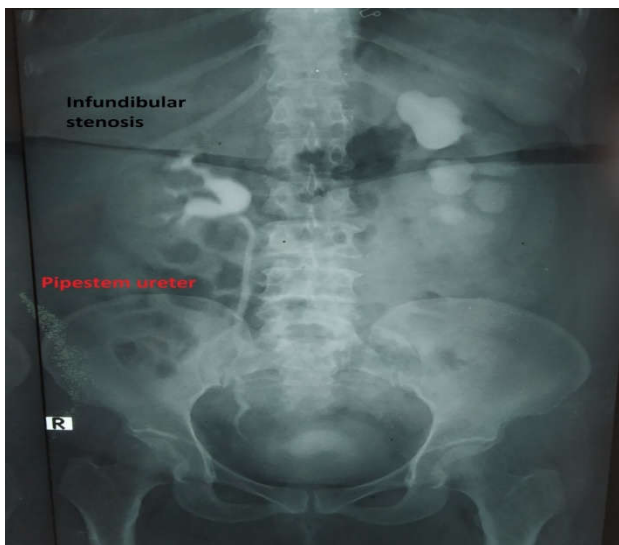
(h) axial section CT showing left contracted kidney with cortical calcification



(c) IVP showing left side saw tooth appearance of ureter due to mucosal irregularities



(f) IVP showing right pipe stem ureter with non visualization of contrast excretion on left side



(d) IVP showing Right kidney infundibular stenosis with pipe stem ureter and left side shows asymmetric calyceal dilatation

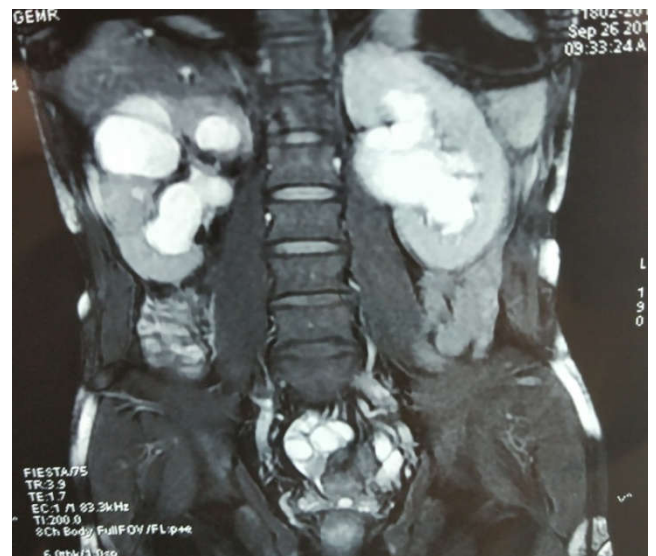


(g) right kidney showing kinked ureter with medialization of the ureter and delayed excretion of contrast

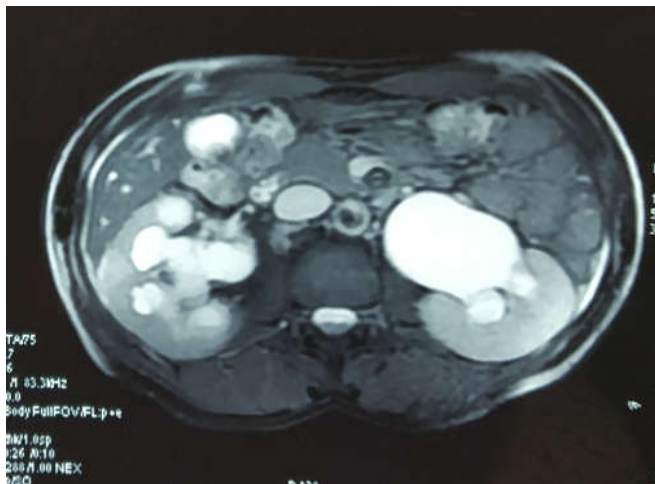


(e) right side pelviureteric junction narrowing with ureteric thickening and left side calyceal blunting with whole dilatation of the ureter

**Magnetic resonance imaging (MRI) changes suggestive of GUTB**



(a) Coronal section of MRI showing with upper pole caliectasis on right side with asymmetric calyceal dilatation with pelvic dilatation on left side.



(b) axial cross section showing assymmetric dilatation with fibrosis on right side with pelvic dilatation on left side



(e) MR urogram showing bilateral assymmetric dilatation with right side pipestem ureter and irregular narrowing and left side tortous dilated irregular ureter. bladder has low capacity with thimble appearance

**Management**

The patients were diagnosed and further managed based upon the extent and spread of the disease. The patients were subjected to medical management in 40 % and surgical management in 60% cases. Frequency distribution of surgical procedures is tabulated in Table 4.

**Table 4** Frequency distribution of surgical procedures.

Surgical Management	Number of Patients
DJ Stent Insertion	(26/75) 34.6%
Nephrectomy	(10/75) 13.3%
Augmentation Cystoplasty	(4/75) 5.3%
Pyeloplasty	(3/75) 4%
Ureteral Reimplantation	(2/75)2.6%

**DISCUSSION**

According to WHO 2019 census, there were 10 million new cases of active tubercular disease and 1.2 million deaths from TB worldwide.<sup>7</sup> Genito-urinary tuberculosis (GUTB) represents 15-20% of cases with prior pulmonary tuberculosis (TB) in developing countries, and 2-10% of cases in developed countries.<sup>2</sup>Genito-urinary tuberculosis is the second most common extra pulmonary site after lymphnodes.<sup>3</sup> Signs and symptoms of GUTB are usually non-specific and often correlate with severity and location of the disease.

Amongst the patients that were incorporated in our study, constitutional symptoms such as fever, weight loss and malaise were present in 40% of the patients, irritativesymptoms such as dysuria were noted in 73% patients, increased frequency of micturition was seen in 80% of the patients and urinary urgency was noted in 77% of the patients.

Obstructive symptoms such as poor urinary stream and straining to void were seen in 26.6% of the patients. Abdominal pain which is usually a late feature of GUTB was present in 68% cases. Hematuria was found in 24% and recurrent Urinary Tract Infection in 26.6% of the patients. Infertility was found to be present in 4% of the patients in our series.

Studies conducted worldwide show that Constitutional symptoms are found in <20% of the patients with GUTB.<sup>8</sup> While dysuria and storage symptoms are present in 40-50% cases, hematuria and abdominal pain are seen in 30-40% of the patients with GUTB.<sup>2</sup>

In the present series, sterile pyuria was seen in around 30% cases, urine for AFB was positive in 26.6%, and raised ESR was seen in 53 % of the patients. Sensitivity of AFB in urine culture is as high as 80-90%.<sup>9</sup> CBNAAT was found to be positive in 20% of the patients. Nucleic acid amplification test in urine has low sensitivity because of presence of natural inhibitor in urine.<sup>10</sup> CBNAAT has been used for MTB detection but cannot be used to monitor response to treatment.<sup>11</sup>

Intravenous pyelogram (IVP) is the gold standard for early changes in genitourinary Tuberculosis. Initial erosive changes in the papillae are seen on IVP.<sup>2</sup> Moth eaten appearance due to calyceal erosion is found bin Genitourinary TB.<sup>12</sup> Ureteric involvement in TB shows rigid, calcified, straightened, pipestem ureter. Hiked up pelvis with sharp angulation of ureteropelvic junction is known as “ker’s kink”.<sup>13</sup> In the present series, 69% patients showed changes in the intravenous pyelogram. Earliest changes like fuzzy, feathery calyx with moth eaten appearance is shown in figure 2(a). Assymmetriccalyceal dilatation with ker’s kink pattern at PUJ level and hiked up pelvis is seen in figure 2 (b). Pelviureteric junction narrowing due to peripelvic fibrosis is seen in figure 2 (b),(e). Earliest changes in ureteric involvement due to mucosal irregularities giving saw tooth appearance is seen in figure 2 (c). Involvement of the infundibulum in genitourinary TB leading to infundibular stenosis is seen in figure 2 (d). This change of infundibular stenosis can be seen as phantom calyx on IVP.<sup>14</sup> Late changes in ureteric involvement showing beaded appearance of ureter (figure 2 (a)) and pipestem ureter (figure 2 (d)(f)).kinking of the ureter and medialization are seen in figure 2(g).

Computed tomography (CT) has largely replaced intravenous urogram.<sup>15</sup> CT shows changes like calcification, scarring and thickening of collecting system. (Figures 1(a to h)). Bladder wall thickening and capacity can be seen on CT.(Figure 1(i)). in the present series, CT changes were seen in 86% of the patients.

Magnetic Resonance imaging(MRI) will not give any additional results as compared to other imaging methods.MRI is useful in pregnant and pediatric patients.<sup>15</sup> In our series, MRU was done in 3 patients having raised creatinine level, showing positive findings.(figures 3 (a to c)).

Cystoscopy has limited role in diagnosis of genitourinary TB. Findings like granulomatous lesion and irregular ureteric orifice can be seen. Bladder capacity can be measured under anaesthesia. Cystoscopic finding of one of our patient showed thimble small capacity bladder with pulling up of verumontanum due to fibrosis.(figure 4 (a))

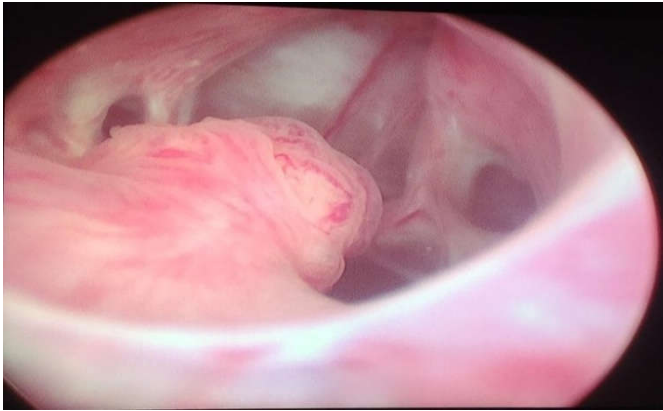


Figure 4 white light cystoscopy showing low capacity thimble bladder with fibrosis in the bladder showing pulled up verumontanum

Genitourinary TB is successfully treated with standard short course regimen of six months .first line antitubercular drugs are given.<sup>16</sup> regimen containing Rifampicin and pyrazinamide are very effective with fastest rate of culture conversion and lowest rate of relapse. In present series, 40% of the patients were managed with medical management alone. Close follow up is required for patients on medical management as healing process is accompanied with fibrosis leading to urinary obstruction and bladder contraction.<sup>17</sup>

Surgical treatment aims to relieve urinary obstruction and drain infected material. Ablative surgeries can remove the non functioning kidney and reconstructive surgeries can help to maintain the functioning of the kidney. Optimal timing of surgery is 4-6 weeks after initiating medical therapy.<sup>1</sup>In our present series, we did DJ stent insertion in 34.6% patients, nephrectomy in 13.3% patients, augmentation cystoplasty in 5.3% patients, pyeloplasty in 4% patients and ureteric reimplantation in 2.6% patients. Gross section of the nephrectomy specimen of GUTB patient is shown in figure (5).

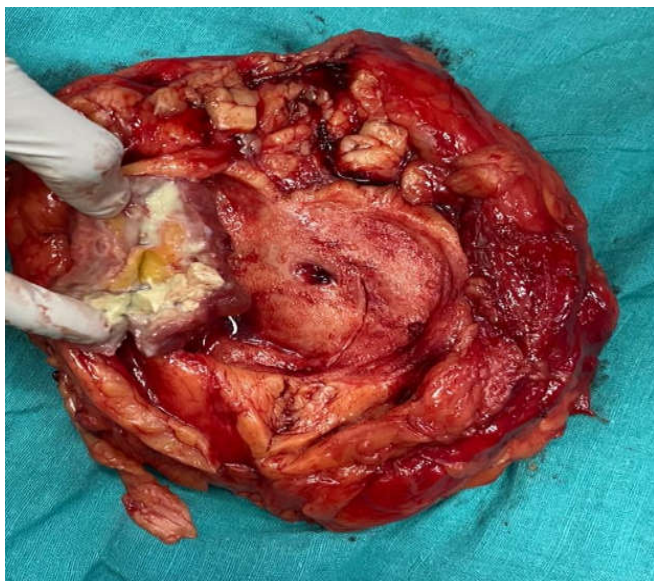


Figure 5 contracted tubercular kidney with calcification.

Early ureteral stenting in the patients of GUTB with ureteric changes limit the further loss of kidney function and improves the results of reconstructive surgeries.<sup>18</sup>in our present series , 26 out of the total 75 patients were managed with endoscopic DJ stenting and medical management.

Endoscopic antegrade or retrograde balloon dilatation was done for TB strictures at ureter, pelviureteric junction, ureterovesical junction and calyceal infundibulum.<sup>19</sup>

Reconstructive surgeries are required for cases with grossly dilated and dysfunctional anatomy that are unlikely to regress with chemotherapy alone.<sup>1</sup>

## CONCLUSION

Genitourinary tuberculosis remains a major health problem in developing countries. GUTB can involve any part of the genitourinary system. Diagnosis is usually delayed due to nonspecific symptoms and variable radiological appearance. Early changes can be seen on intravenous pyelogram and computed tomography. Immediate stenting and medical management is the mainstay of GUTB treatment.Long term follow up is required after reconstructive surgeries.

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