

A clinical study on surgical causes of Hematuria

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ABSTRACT

Introduction: Hematuria is a clinical sign and symptom that every individual would have a worst nightmare and invokes a physician to carefully evaluate possible causes of hematuria. It may be medical or surgical causes. A thorough examination is required to exact the primary pathology. As such, a study on hematuria in North east India is not sufficiently researched or published. **Material & methods:** Here we present an observational study in our institution on that very topic. A study was done purely on surgical causes of hematuria on symptomatic patients. It was done on the inpatient and outpatient basis in Assam Medical College, Dibrugarh during the period of 2016-2019. Total 43 patients were evaluated, who came with symptomatic hematuria. **Results:** Out of 43 cases of symptomatic hematuria, 34 were male and 9 were females patients. Carcinoma urinary bladder was the commonest cause of hematuria, followed by BPH, urolithiasis, carcinoma prostrate, carcinoma upper urinary tract, etc. **Conclusion:** Benign prostatic hyperplasia was found to be the most common benign cause and carcinoma bladder was the commonest malignant cause of hematuria.

Keywords: Hematuria; causes of hematuria, medical, surgical

Introduction

Hematuria can be defined as a frank blood coming with the urine or microscopically when more than three red blood cells (RBCs) are seen under per high-power magnification.^[1] Hematuria may be described as macroscopic or microscopic. It is known as gross hematuria when the patient can see blood coming in the urine and when the presence of RBCs in the urine is detected under microscopic examination only, it is known as microscopic hematuria. It is noted that asymptomatic hematuria is more prevalent than symptomatic and in approximately 9–18%,^[2] RBCs were noted in asymptomatic adults, and among them 13% land up in urologic malignancy.^[3]

The causes of hematuria can be categorized into glomerular or non-glomerular.^[1] When RBC casts, dymorphic erythrocytes are present in the urine along with proteinuria, it is known as glomerular hematuria.^[1] Various causes (especially surgical

causes) ranges from calculi, neoplasm, benign prostatic hyperplasia (BPH), cystitis, trauma, urethral stricture, iatrogenic from recent instrumentation, cystocele, vesicoureteral reflux, posterior urethral valves.^[4] If microscopic hematuria occurs because of benign causes like menstruation, recent vigorous exercise, viral illness or trauma, repeated analysis of the urine should be done after 48 h of cessation of these activities.^[5]

The source of hematuria can be predicted from each relationship to the various stages of urination. Hematuria at the beginning of micturition usually suggest inflammatory causes from urethra, whereas if the source of hematuria is from neck of urinary bladder or prostatic part of urethra, Hematuria will be seen toward the last part of urination.^[1]

Usually any amount of blood in urine of adults should prompt investigations, keeping in mind malignancy as the first differential diagnosis.^[1] A detailed history, physical examination are indispensable to the evaluation of hematuria and its relevant investigations are needed to evaluate the causes of hematuria.

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Here in the study, the focus is to find out the different surgical causes of hematuria by clinical assessment/investigation and to assess the different modes of their managements.

Materials and Methods

- **Inclusion criteria-** 1) Patients attending inpatient or outpatient department with symptomatic hematuria.
- **Exclusion criteria-** 1) Patients with medical cause of hematuria like glomerulonephritis, IgA nephropathy, hemoglobinopathies, drugs induced hematuria, bleeding disorders, nephritic syndrome, Alport syndrome, etc.
 - 2) Patients aged less than 18 years.
 - 3) Patients with exercise induced hematuria.
 - 4) Postoperative cases involving the KUB region
 - 5) Patients with traumatic causes of hematuria.
 - 6) Patients who are not giving consent for study.

Ethical Clearance:- The study was conducted after obtaining ethical clearance institute Ethics Committee (Human) of Assam Medical College and Hospital.

In this study, Gross hematuria and microscopic hematuria (>3/high power field) were taken as a standard criteria for inclusion. **Medical causes** are excluded after proper clinical, laboratory, and radiological investigations.

Causes like bleeding diathesis, hemoglobinopathy, and glomerulonephritis are sorted out by performing the investigations like complete blood count, coagulation profile, hemoglobin typing and irine examination and cytology. After evaluation of hematuria patients, treatment/surgical procedures was initiated according to the etiology and they were properly followed up.

Result and Observations

We have 43 cases of symptomatic hematuria, among which 34 case are male and 9 are female patients [Table 1]. We have noted that above 50 years groups' accounts for most affected groups [Table 2]. Carcinoma urinary bladder is found to be a common cause of hematuria [Table 3] followed by BPH, urolithiasis, carcinoma prostate, carcinoma upper urinary tract, carcinoma renal and adult polycystic kidney disease, respectively. Treatment are given accordingly to the causes and stages of diseases.

Discussion

In the present study, it was noted that symptomatic hematuria are more common in male gender [Table 1] and it involved the above 50 years groups [Table 2]. Carcinoma bladder was found to be common cause of hematuria [Table 3].

The mean age in their series of Keng Lim Ng *et al.*^[6] was 59 years. Benign prostatic hyperplasia (22.1%) was the most common cause in their series of 390 patients. The other causes included

urinary tract calculi (20%), cystitis, tumors of urinary bladder, and other genito-urinary tract.

M A Ogunjimi *et al.*^[7] during their 1 year study found that benign prostatic hyperplasia (30.4%) was the most frequent cause of hematuria and carcinoma of urinary bladder (12.6%) along with prostatic cancer (10.1%) were the other causes.

D. Dawan *et al.*^[8] also had a similar finding to the present study in terms of common cause of hematuria, that is, cancer of urinary bladder (31%), BPH (14%), and urolithiasis (12%). The present study showed that carcinoma bladder (51.16%) is the most common cause followed by BPH (20.93%) and urolithiasis (11.62%).

According to Debkumar Ray *et al.*^[9] mean age of carcinoma bladder was 57 years old and more predilection for male individual. In the present study, we have found that carcinoma bladder is common in above 50 years of age and has a more predilection toward male gender.

Konstantinos Stamatou *et al.*^[10] studied that ultrasonography has the sensitivity (87.1%) and specificity (98.1%) and concluded that cystoscopy is better than ultrasonography (USG) in assessing a bladder pathology.

Table 1: Sex distribution of haematuria

Sex	No. of cases	Percentage
Male	34	79.06
Female	9	20.93
Total	43	100

Table 2: Age-wise distribution of Haematuria

Age	No. of cases	Percentage
18-30	1	2.32
31-40	9	20.93
41-50	4	9.3
51-60	14	32.55
61-70	10	23.25
>70	5	11.62
Total	43	

Table 3: Distribution of the patients in relation to etiology

Disease	No. of patients	Male	Female	Percentage
BPH	9	9	-	20.93
Urolithiasis	5	4	1	11.62
Carcinoma bladder	22	18	4	51.16
Carcinoma prostate	3	3	-	6.97
Carcinoma upper urinary tract	2	0	2	4.65
Renal cell carcinoma	1	0	1	2.32
Polycystic kidney disease	1	0	1	2.32

In the present study, we found that USG abdomen was able to detect a bladder growth in all cases of suspected carcinoma bladder and cystoscopy further consolidate the findings [Figure 1. Contrast enhanced computed tomography (CECT) sensitivity was 63.63%.

CA Sadow *et al.* study showed that CT scans sensitivity and specificity were 79% and 94%, respectively. For cystoscopy, accuracy rate was 93%.^[11]

Arsalan Aliramaji (2015)^[12] found that the most common tumors type involvement is transitional cell carcinoma (TCC), and other tumors included are adenocarcinoma, squamous cell carcinoma. Present study also have a transitional tumor type.

Maurizio Brausi *et al.*^[13] recommended that in case of non-muscle invasive urinary bladder carcinoma, a complete transurethral bladder tumor resection, that is, TURBT is sufficed. In case of low risk and intermediate cases, a chemotherapeutic instillation, that is, intravesical bacillus Calmette-Guérin or intravesical chemotherapy immediately after post TURBT is suggested. In cases of high risk, recommendation is instillation of bacillus Calmette-Guérin as induction dose plus maintenance dose.

Chen RC, *et al.*^[14] stated that with trimodality therapy, (TURBT, Chemotherapy, and radiotherapy) 5 years survival rates ranges from 48 to 65% in case of muscle invasive disease.

In our study, we had 16 cases of low-grade transitional cell carcinoma (TCC) and 5 cases were high-grade transitional cell carcinoma. Depending on the stage of tumor, patients were subjected to the treatment shown in Table 4.

In this study, 9 patients have presented with a complain of hematuria because of BPH and maximum were above the 50 years age group. Wenying Wang *et al.*^[15] study showed that common age groups presenting with a BPH were 40 years and above groups was 36.6%.

In this study, we have found that other than hematuria, hesitancy occur in 67%, urgency in 67%, increased frequency in 44.44%, and weak stream in 88.9%. Some of them had a history of catheterization in the past. Some of them presented with retention of urine.

J.L. Bosch *et al.*^[16] reported a series of BPH and noted the frequency of symptom (in decreasing order), that is, Nocturia -75%, Increased frequency of urine- 60%, weak urinary stream -47% Urgency for urination-31%, Incomplete emptying of bladder 30%, Hesitancy of micturition-15%.

Jens Rassweiler *et al.*^[17] found that the complications following TURP to be TUR syndrome 1.1%, clot retention 5%, and urinary tract infection 8.2%, urinary retention 9%. And also found that in 30–40% patients, urge incontinence of urine happen early, but stress incontinence because of iatrogenic cause is rare (<0.5%).

Preliminary decompression was done in all cases. 8 cases were subjected to TURP [Figure 2]. In 1 case, symptom got relief following conservative treatment with medication. In the study, 3 patients had a hemorrhage postoperatively, for which blood transfusion were given to the patients. Temporary incontinence occurred in 1 patients in early postoperative period. All the patients showed improvement of symptoms in subsequent follow-up.

In the present study, the incidence of urolithiasis as a cause of hematuria was 11.62%, that is, 5 cases. If taking into account the age distribution, in this study above 3rd decade have contributed to 9.3% and male and female ratio is 4:1.

Haithem Abd Al-Khazrajee *et al.*^[18] noted that age group 21-50 years are more susceptible to urolithiasis. RB Nerli *et al.*^[19] found that male individual are prone to urolithiasis.

Richard *et al.*^[20] studied upon 163 patients and noted that the stones were seen on 63% of the KUB (kidney, ureter, bladder)

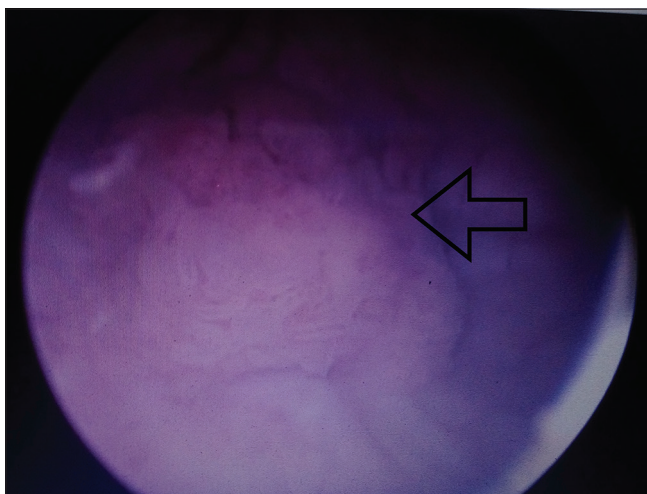


Figure 1: (arrow) showing cystoscopy view of urinary bladder growth

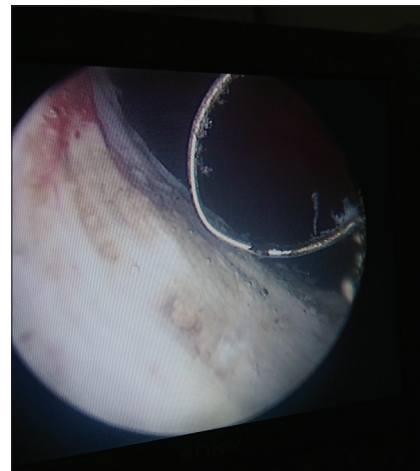


Figure 2: Intraoperative TURP (Transurethral resection of prostate) procedure

Table 4: A type of therapy given to carcinoma urinary bladder

Stage of tumour	No. of patients	TURBT	TURBT + Intravesical BCG	Chemotherapy + Radiotherapy
I	16	16	-	-
II	5	-	5	-
III	-	-	-	-
IV	1	-	-	1

**Figure 3:** Stone in x-ray erect abdomen

X-rays. Plain X-ray abdomen was performed in all the cases. All cases were detected calculi in X-ray abdomen film as the stone size were greater than 1 cm [Figure 3].

Salinawati B, *et al.*^[21] did a retrospective comparative study of sensitivity and specificity of USG on a 201 patients for the presence of calculi. They found that the sensitivity and specificity of renal stone detection on USG were 53% and 85%, respectively, and the sensitivity and specificity of ureteric stone detection on USG were 12% and 97%, respectively.

Plain X-ray KUB was carried out on those 5 cases, X-ray KUB had detected the calculi. USG was done and in all cases, it was found that USG is able to detect stone in symptomatic patients and also caught an obstructive effect on kidney. Hydronephrosis changes was seen in 2 cases. Intravenous urography was done in all cases [Figure 4]. In all cases, it revealed normal functioning kidney.

In this study, the stones size was more than 1 cm. Open procedure was performed. It was found that intra-operative finding was same as pre-operative diagnosis. Ahmed R. El-Nahas *et al.*^[22] found that the stone free rate after open surgery to be 78.6%. No recurrence were noted within the stipulated period of study.

In the study, we had three cases of carcinoma prostate. Elizabeth J. Davis *et al.*^[23] found that carcinoma prostate is common in 65–74 years age groups. M. A. Sutton *et al.*^[24] emphasized that the per rectal examination is critical for the detection of early stage prostate cancers and other ano-rectal disease, and should be remain a part of the regular screening physical examination.

**Figure 4:** Intravenous urogram (IVU) depicting a hydronephrosis changes due to stone

In our study, on digital rectal examination, the glands were indurated and there was a obliteration of lateral sulci in each of them. USG abdomen showed irregularity in gland and hypertrophied bladder wall in 2 patients. In 1 patient, CT abdomen finding showed extracapsular infiltration with retroperitoneal lymphadenopathy. Skiagrams of that patient show bony involvement.

Histopathological finding showed adenocarcinoma type in two patient. Another patient was diagnosed as stage IV carcinoma prostate and later on the patient expired. In two patients, transurethral resection of prostate (TURP) with bilateral orchidectomy was done. 1 patient of stage IV was treated with chemotherapy and radiotherapy and but later on the patient expired.

Donald S. crain *et al.*^[25] suggested that in cases of advanced carcinoma prostate simply doing TURP procedure can alleviate urinary symptoms.

In this study, we had 2 patients of carcinoma of upper urinary tract. Both are female and aged 57 years and 46 years respectively. Diagnosis was made based on USG, CT KUB, cystoscopy [Figure 5], intra-operative, and histopathology finding.

Holmang and Johansson^[26] noted that the incidence of upper tract tumours is highest; in the age ranging from 75 to 79 years. Anderstrom C, *et al.* found that the upper urinary tract carcinoma is rare before the age of 40 years and the mean age of presentation is at the age of 65 years.^[27]

According to Hagen Blaszyk *et al.*,^[28] the male–female ratio was 2.8:1 and the median age of presentation was 70 years. Here, in the study, we had two patients of female gender.

USH showed a large left lower ureteric mass with hydronephrosis changes in one patient and another showed a left upper ureteric mass involving left Kidney. Computed tomography showed a heterogenous mass in left upper ureteric involving left pelvicalyceal system in 1st patient and a heterogenous mass at left lower ureteric region with hydronephrosis changes in a 2nd patient. Histopathology finding shows transitional cell carcinoma.

Jeffrey J Leow *et al.*^[29] advocated that in a low and high risk diseases, kidney sparing surgery (KSS) and radical nephroureterectomy (RNU) should be performed respectively and also recommended platinum-based combination chemotherapy. We performed radical nephroureterectomy [Figure 6] in both the patients. Gemcitabine and cisplatin were given to both the patients.

In this study, only 1 case, aged 47 years/female was diagnosed as stage II renal cell carcinoma (RCC), presented with hematuria. Shalini Agnihotri *et al.*^[30] studied on 617 patients and found that the mean age of presentation was age younger than 50 years and clear cell RCC account for 71.33% of the patients. Clear cell accounts for 75% of all RCCs, representing the most common histological subtypes of RCC (Muglia VF, *et al.*).^[31] Ares Valdés Y, *et al.*^[32] established that USG and CT scan could confirmed the 100% diagnosis of the renal tumors.

On clinical examination, a lump was present. USG and CT abdomen [Figure 7] confirmed the diagnosis. The patient had undergone left sided radical nephrectomy. Histopathological report showed clear cell type. The patient came for follow-up and showed good response.

In this study, 1 case was diagnosed as bilateral polycystic kidney disease. The female patient aged 50 years presented with gross hematuria and lump abdomen. Her serum creatinine level was 6.6 mg/dl, Hb% was 5.5 gm%. USG abdomen showed multiple cysts with loss of renal parenchyma. CT KUB could not be done. Christian R Halvorson *et al.*^[33] noted that polycystic kidney disease typically affect 30–50 years of age groups, moreover it could present with acute pain abdomen and gross or microscopic hematuria. Two cysts in each kidney in any individuals, age ranging from 30 to 59 years, and 4 cysts in each kidney in above 60 years of age, adult polycystic kidney (ADPK) should be favored (Ravine D, *et al.*).^[34] Hematuria in ADPK results from rupture of cysts and bleeding is usually self-limited. She was treated conservatively with blood transfusion and within 2 days, hematuria stops and serum creatinine levels came down after dialysis. She is being on followed up.

Conclusion

This observational study has shown that hematuria is a symptom arising from urinary tract system disease, involving all the age

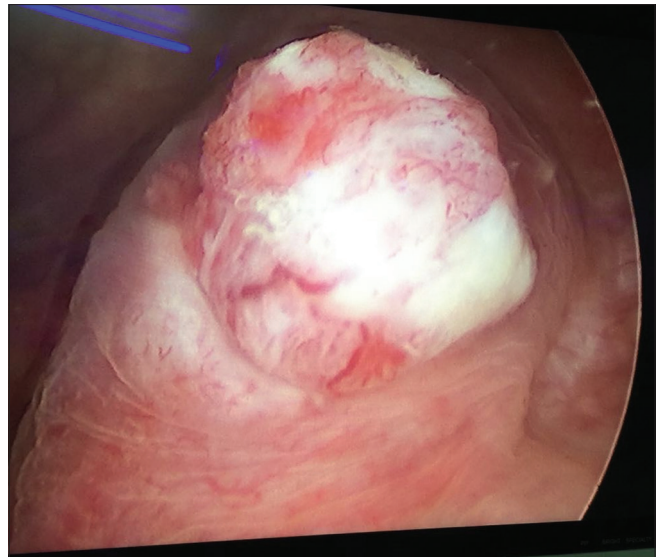


Figure 5: Cystoscopy picture of lower ureter growth

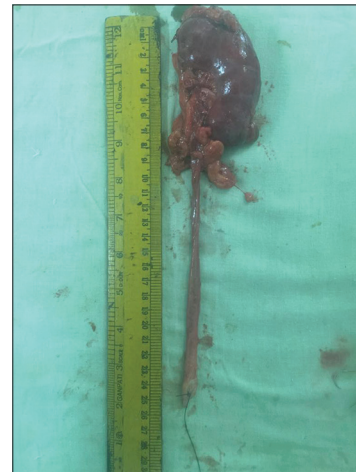


Figure 6: Resected specimen of radical nephroureterectomy



Figure 7: CT abdomen scan growth in left renal growth

groups. It may be caused by benign or malignant diseases of the urinary system. Benign prostatic hyperplasia was found to be the most common benign cause and carcinoma bladder was

the commonest malignant cause of hematuria. Although in the present study, sample size is less, but taking into account all the others studies, it is observed that common surgical cause of hematuria is found to be a carcinoma bladder and BPH in older aged group and urolithiasis in younger aged group (except the exclusion criteria). So at last, we suggest to click in mind a aforesaid probable surgical cause of hematuria, if any patients present with blood in the urine.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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