CLINICOPATHOLOGICAL STUDY OF BLADDER OUTFLOW OBSTRUCTION:STUDY OF 300 CASES

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Introduction

Bladder Outflow Obstruction (BOO) – The term denotes any anatomical or functional failure of the bladder to empty itself due to obstruction at its outlet. Retained urine may lead to dysfunction of the muscular conduit and reservoir followed by renal parenchymal damage due to backflow pressure, initially reversible, thereafter irreversible.

BOO results from a variety of aetiologies, which may be functional or anatomic. BOO often produces lower urinary tract symptoms (LUTS), although the degree of botheration by LUTS is highly variable and not predictable on the basis of the specific inciting aetiology. Induced lower urinary tract symptoms may be predominantly obstructive, irritative, or often a combination of both. Typically, obstructive symptoms includes hesitancy, sensation of incomplete bladder emptying, diminished urinary stream, and post voiding urinary dribbling. Irritative complaints include urinary urgency, frequency of urination, occasional dysuria, and nocturia. Rarely symptoms are related to BOO isolated; often the individual experiencing LUTS presents with a variety of mixed symptoms of obstruction and irritation. BOO may also occur in the complete absence of symptoms and be first identified in the scenario of urinary retention or decompensation of the upper urinary tracts[1].

Functional obstruction may be caused by detrusor-sphincter dyssynergia (DSD), either at the level of the smooth muscle or rhabdosphincter.Primary bladder neck obstruction, which may be functional or anatomic in character; or due to dysfunctional voiding, associated with learned voiding disorders or pelvic floor dysfunction associated with pain syndromes. Anatomic obstruction in men results most commonly from benign prostatic enlargement (BPH) or urethral stricture. In women, anatomic obstruction most commonly arises from incontinence procedures[2].

The evaluation goal is not only to establish a likely diagnosis, but also to define bladder storage and emptying characteristics. Bladder storage abnormality is often an under appreciated sequele of BOO, and is associated with substantive symptomatic and physiologic effect.Although urodynamic evaluation and pressure flow evaluation is the gold standard diagnostic tool, other modalities may also be used, including post void residual analysis, urinary flow rates, cystoscopy, and selected radiologic procedures. Patient self-appraisal of symptoms using various inventories such as the American Urologic Association Symptom Index or the International Prostate Symptom Score is relevant to the initial assessment and subsequent follow up[1].

When BOO is not prevented, timely treated or neglected may lead to acute or chronic renal insufficiency or overt kidney failure. Obstruction may lead to a salt-losing nephropathy and urinary concentrating defects. Renal tubular acidosis (RTA) type IV, hyperkalemia, hypomagnesaemia, and hypophosphatemia are common sequele of chronic obstruction. Although acute or chronic obstruction may cause urinary tract infection (UTI), other sequele such as renal calculi, hypertension, and polycythemia are associated with chronic retention[2,3]. Therefore, adopting a stepwise approach in the evaluation of bladder Outflow Obstruction (BOO) patients is important to initiate efficient management. Hence, the classic initial step is to study the pattern of presentation, commonly found causes, observe the pathological changes due to Bladder Outflow Obstruction and to study the treatment outcome is of immense importance now a days[4].

Objectives

The objectives of this study is determine the causes of BOO, to assess the pattern of presentation and to

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review the pathogenesis and pathological effects of BOO in the Urology Centre of Combined Military Hospital (CMH) Dhaka.

Materials and Method

This was a prospective, hospital-based, observational study performed to establish the diagnosis along with identification of pathological changes in the urinary tract. Patients with Bladder Outflow Obstruction admitted in Urology Centre, CMH Dhaka were enrolled in this study. The study was conducted during the period between Jan 2016 to Jan 2017. All consecutive diagnosed patients of Bladder Outflow Obstruction (BOO) attended in Combined Military Hospital (CMH) Dhaka during the study period are included and patients who died before confirmation of definitive diagnosis and were failed to follow up at Urology OPD are excluded.In each case detail history was taken and relevant routine and special investigations like USG of KUB, prostate, PVR, MCC, Uroflowmetry, S.PSA, Urodynamic study was carried out. All information's were recorded in preformed structured data collection sheet. All data transferred to microsoft excel version 2010. Results were aggregated; mean and percentage were calculated and presented in charts, tables and diagrams.

Results

In this series out of 300 patient, the peak age incidence of bladder outflow obstruction was in 5th decade (81%) followed by 6th decade 54 (18%). The mean age of presentation was 48 year.

Table-I: Age distribution of the patients (n=300)

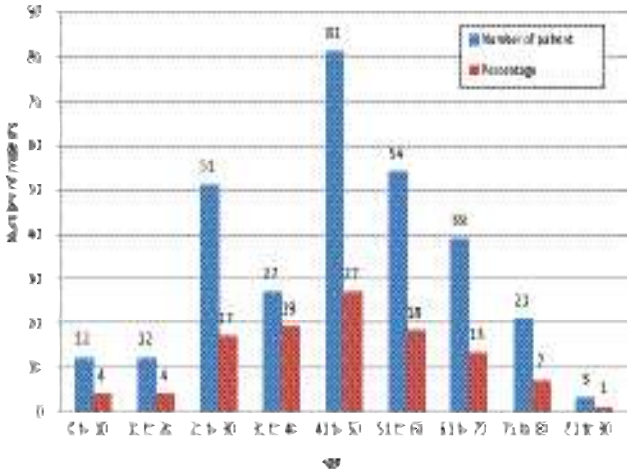

Fig.-1: *Bar diagram showing age incidence.*

Table-II: Sex distribution of the patients (n=300)

Majority of the patient were male (95%). Male female ratio was 19:1

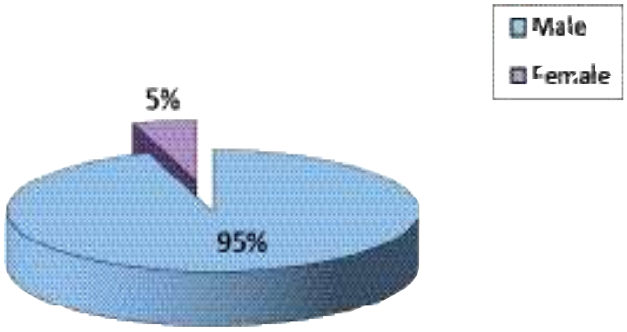

Fig.-2: *Pye chart showing sex distribution*

Table-III: Aetiology of bladder outflow obstruction
The commonest cause of bladder outflow obstruction was BEP (31%), followed by stricture urethra (26%) and ruptured urethra (13%) respectively.

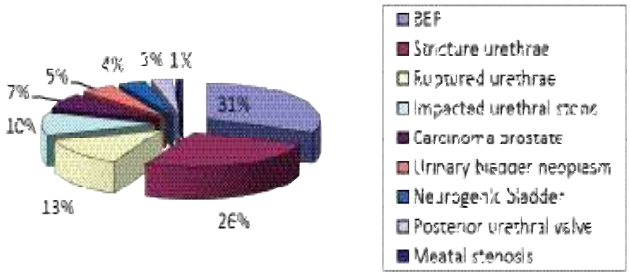

Fig.-3: *Pye Chart showing aetiology of bladder outflow obstruction*

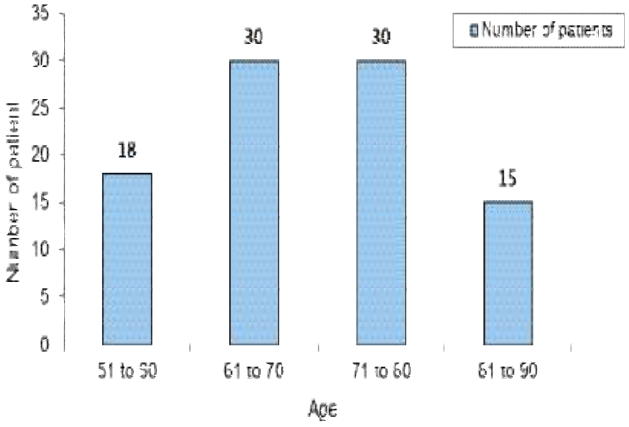

Table-IV: *Age distribution of benign enlargement of prostate (n=93)*

In this study, 64.52% patients were among 6th and 7th decade. Mean age of patients presented with BEP was 68 year.

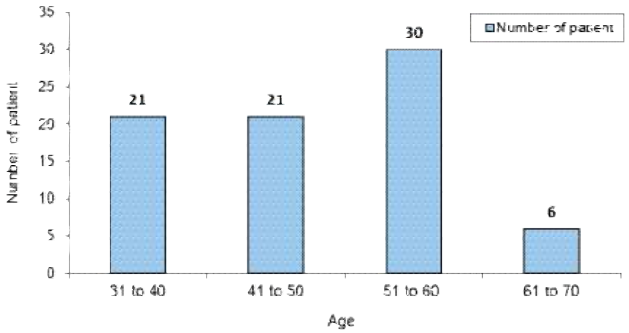

Table-V: *Age distribution of Stricture urethra (n=78)*

Total 78 patients presented with stricture urethra and most of them (38.46%) are within 51 to 60 year age group. The mean age was 48 years.

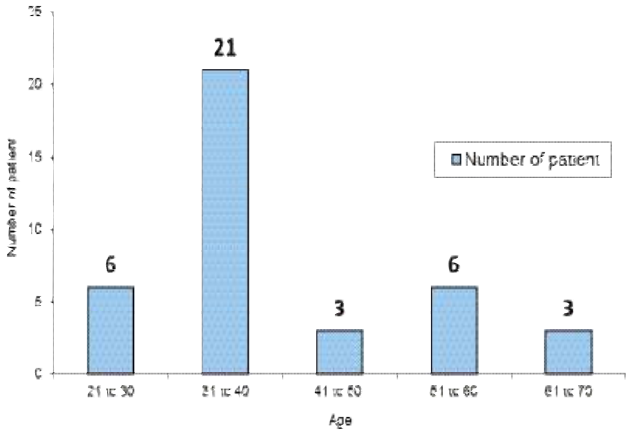

Table-VI: Age distribution of Ruptured urethra (n=39)

The Peak age incidence of Ruptured urethra was at 31 to 40 year (53.85%). The mean age of presentation was 40 year.

Table-VII
Causes of stricture urethra (n=78)

Causes	Number of patients	Percentage
Inflammatory	54	69.23%
Post traumatic	24	30.77%
Post-operative	00	00%

The most common cause of stricture urethra was inflammatory in nature (69.23%) (n= 78). Stricture urethra as a post-operative complication was not found in this study.

Table-VIII
Clinical presentation of bladder outflow obstruction (n=300)

Symptoms	Number of patient	Percentage
Difficulty in micturition	288	96%
Retention of urine	237	79%
Overflow/Dribbling	123	41%
Poor stream	117	39%
Supra pubic pain	99	33%
Hematuria	*63*	21%
Dysuria	39	13%
Per urethral bleeding	18	06%
Inability to move lower limbs	12	04%
Drowsiness and Vomiting	06	02%
Shock	03	01%

* All 300 patients had more than one presenting symptoms.

The most common symptom was difficulty in micturition 288 (96%), followed by urinary retention of various degrees in 79% patient.

Table-IX
Clinical signs of bladder outlet obstruction (n=300)

Signs	Number of patient	Percentage
Distended bladder	276	92%
Urethra		
Pinhole meatus	03	01%
Blood in meatus	18	06%
Pus discharge	54	18%
Palpable stone	*18*	06%
Palpable stricture	78	26%
Digital rectal examination		
Lax anal tone	12	04%
Enlarged firm prostate	93	31%
Enlarged hard noduler prostate	12	04%
Fibrosed prostate	09	03%
Palpable stone in posterior urethra	12	04%
Anemia	102	34%
Diminished knee jerk	12	04%
Edema	06	02%
Dehydration	06	02%
Ballotable kidney	12	04%
Shock	03	04%

* All 300 patients had more than one positive signs.

Table-X

Investigations of bladder outlet obstruction (n= 300)

Investigation	Number of patient	Percentage
Serum creatinine	300	100%
Blood urea	300	100%
Urine R/M/E	300	100%
Urine C/S	300	100%
Hemoglobin%	300	100%
USG of KUB, Prostate, PVR, MCC	*300*	100%
RBS	*300*	100%
Uroflowmetry	*183*	61%
Urodynamic study	*115*	26.86 %
Serum PSA	114	38%
RGU, MCU	87	29%
X-Ray pelvis	60	20%
X-Ray KUB region	30	10%
IVU	21	07%
Needle biopsy of prostate	21	07%
CT scan	18	06%

In this study, Serum creatinine, Blood urea, Urine R/M/E, Urine C/S, Hemoglobin,USG of KUB, Prostate, PVR done routinely. Other investigations were done according to the physical symptoms and routine investigation findings.

Table-XI

Laboratory findings of different patients (n= 300)

Investigation	Result	Number of patient	Percentage
Hemoglobin % (n=300)	<10mg/dl>10 mg/dl	102198	34%66%
Blood urea(n=300)	15-50 mg/dl>51 mg/dll	28812	96%04%
Serum creatinine(n=300)	0.7- 1.5 mg/dl>1.5 mg/dl	28812	96%04%
RBS(n=300)	<7.8 m mol/L>7.8 m mol/L	26139	87%13%
Serum PSA (n=114)	<4 ng/ml>4 ng/ml	9321	87.57%18.42%
Urine R/M/E(n=300)	*Features of UTIHaematuriaNon specific*	9081129	30%27%43%
Uroflowmetry(n=183)	*Q max <10 ml/sQ max >10 ml/s*	10083	54.64%45.35%

Serum PSA was done in 114 and Uroflowmetry done in 183 patients. 34% patient was anemic and 4% patient was having raised Urea and Creatinine level. 30% patient was found to have features of UTI in urine R/M/E whereas 27% had hematuria.

Table-XII
Urine culture result (n= 300)

Growth of organism	No. of patient	Percentage
No growth	210	70%
E. coli	60	20%
Proteus	18	06%
Staphylococcus	06	02%
Pseudomonas	06	02%

In this study, E. coli was the most frequent (20%) organism found in positive cultures, followed by Proteus in 6% patients.

Table-XIII
Imaging study results (n=300)

Imaging study	Findings	Number of patient	Percentage
USG of KUB,	Bilateral hydronephrotic kidneys with	21	07%
Prostate, PVR	hydroureter		
(n=300)	Enlarged prostate with significant PVR	91	31%
	Enlarged prostate with nodularity	12	04%
	Fibrosed prostate with nodularity	09	03%
	Soft tissue mass in bladder	15	05%
	Impacted stone in urethra	18	06%
	Bladder stone	09	03%
RGU, MCU	Stricture urethra	78	89.65%
(n= 87)	PUV with proximal dilatation	09	10.34%
X ray pelvis	Pelvic fracture	27	45%
(n= 60)	Osteosclerotic lesion in ileum	06	10%
Plain X ray KUB	Radio-opaque shadow in urethra	30	100%
region (n= 30)	Radio-opaque shadow in bladder	09	30%
IVU (n= 21)	Bilateral hydronephrotic kidneys with hydroureter	21	100%

*Many patients had more than one radiological findings and few had no abnormality detected on imaging study. Only positive findings are shown in this table.

Discussion

In this prospective, hospital-based, observational study, 300 patients with Bladder Outlet Obstruction (BOO), who attended in the Urology Centre of CMH Dhaka are studied. The age of the patient in this study ranges from 2 year to 85 years, while the peak age of incidence of BOO in 5th decade (27%) followed by 6th decade (18%) and 3rd decade (17%) [Figure 1]. The mean age of presentation was 48 year.Majority of the patient were male (95%)[Figure 2]. The Male to female ratio was 19:1. In the study of Alam J[23] and the series of Satter A M R[24] the results are almost similar to this study. But in the study published by Jahangir A[25] the peak age of BOO was in 6th decade.

Benign Enlargement of Prostate was found the commonest cause of BOO in this study (31%) [Figure 3], among them 64.52% patients were at 6th and 7th decade of their life [Figure 4]. The mean age of patients presented with BEP was 68 year. This findings correlates to the findings published by Roger R

Dmochowski[1], Alam J[23] and Jahangir A [25]. In the series published by Dawson et al[9] the mean age of presentation of BEP was 72 years.

The stricture urethra was the next common cause of BOO in this study, comprising 78 patients (26%), most of them (38.46%) are within 51 to 60 year age group followed by the group of 31 to 40 and 41 to 50 years, both equally 26.92%[Figure 5]. The mean age of presentation was 48 years. In the study of ShakibahmedMasu, Prashant Mukadam, Abdullah Mansuri [26] also found Stricture urethra as the second commonest cause of BOO in men. Results of our study are almost similar to the findings ofSatter A M R[24].

The most common cause of stricture urethra was inflammatory in nature 78 (69.23%) [Table 1] in this series. Stricture urethra as a post-operative complication was not found in this study. Though in the study of Roger R Dmochowski[1] the results are different, as he stated- other prevailing causes of BOO in men include urethral stricture disease. This is a much more common entity in men than in women and often is not perceived as an anatomic finding until a patient presents with urinary retention or other symptoms initially thought to be due to non-specific LUTS. Previously considered to be primarily due to inflammatory disorders such as urethritis, urethral stricture disease is now considered to be most commonly due to trauma [1]. But our results are equivocal to the studies of Alam J[23] and Jahangir A[25]. The study of Bhandari et al[27] done at India also showed high incidence (95.30%) of inflammatory urethral stricture in india subcontinent while Blandy et al[28] found 22.1%. Therefore, it varies with study to study according to place of the study.

Rupture urethra was the next encountered cause of BOO, found in 39 patients (13%).Among this group peak age incidence of ruptured urethra was at 31 to 40 year (53.85%). The mean age of presentation was 40 year [Figure 6]. All patient of ruptured urethra had the history of trauma and out of 39 patient 27 (69.23%) patients had pelvic fracture [Table 7]. This can be explained as the 3rd and 4th decade of life is the most active age and trauma is associated with all this activities.

In this study 30 patient (10%) had impacted urethral stone. In the study of Jahangir A[25] it was 14%. Clinical diagnosis was made by urethral palpation and digital rectal examination, with help of radiological tools. This figure coincides with El Sharif et al[29]. Twelve patients (40%) of them had impaction of stone in anterior urethra. Rest 18 patient (60%) of them had impaction in posterior urethra. In the series of Jahangir A[25] it was 28.57% and 71.42% respectively. Other causes of BOO in this series include carcinoma of prostate (07%), urinary bladder neoplasm (05%), neurogenic bladder (04%), posterior urethral valve (03%) and meatal stenosis (01%).

On examination, 92% patients were found to have distended bladder [Table 3]. Twenty four patients (08%) were admitted into this hospital with catheterization done in local hospital, among them 18 with BEP and 6 with carcinoma prostate. 88% patient of Alam J[23] series and 100% patient of Jahangir A[25] study were admitted with distended bladder. The result of this series is similar to that of Satter A M R[24]. Distended urinary bladder was found in all 39 patients (13%) of ruptured urethra during this study. Similar presentation was also reported by Malek et al[30]. All 30 (10%) patient of impacted urethral stone had distended urinary bladder at their presentation. Similar incident were reported by Durazi and Samiei[31]. Fifty four patients (18%) had urethral discharge of pus and 78 patients (26%) had palpable cord like feeling along the urethra.

In the studies of Alam J[23], Jahangir A[25] and O'Flynn[32] BOO occurred in 04%, 02% and 30% of cases respectively due to spinal injury. In our study 04% patient admitted with neurogenic bladder due to spinal injury and all of them presented with distended bladder. On digital rectal examination, all of them had lax anal tone and diminished or absent knee jerk.

All 39 patients (13%) of ruptured urethra had the history of trauma and 18 of them (46.15%) of rupture urethra showed blood in the urethral meatus. Three of the patients were in shock [Table 3]. In the study of Malek et al[30]. 28.57% patient of ruptured urethra had blood in the meatus. In this study 93 patients (31%) had enlarged firm prostate and enlarged hard nodular prostate was found among 12 (4%) patients. Fibrosed hard nodularity was found in 9 patients (03%)[Table 3]. Prostatic biopsy was taken in this 21 patient (07%) and 09 of them confirmed carcinoma.Anaemia was present in 102 patients (34%), oedema in 6 patients (2%). Dehydration and ballotable kidneys were found in 2% and 4% patients. This finding correlates with the pathological nature of chronic obstructive uropathy[10]. After clinical evaluation, only relevant investigations were done to confirm the diagnosis and to assess the extent of the pathological changes. In this study, all

patients were found prescribed Serum creatinine, Blood urea, Urine R/M/E, Urine C/S, Hemoglobin,USG of KUB, Prostate and PVR routinely. Other investigations were done according to the physical sign symptoms and routine investigation findings [Table 4].

Laboratory investigations [Table5] shows 102 (34%) patients had anemia and 12 (4%) patient was having raised Urea and Creatinine level. 90 (30%) patient was found to have features of UTI in urine R/M/E whereas 81 (27%) had hematuria.Among them 36 (12%) patient had BEP, 15 (05%) had bladder neoplasm and 12 (04%) had carcinoma of prostate. Urine culture results of 300 patients [Table6], shows 70% negative culture. Rest 30% had isolated organism in urine. Such high number of negative culture may be explained by the study by Samuel A Silver[33] showing rate of negative culture up to 80% and Martina Franz and Walter H. Hörl[34]. explaining the causes of such high negative cultures in their publication. Among the culture positive specimens 90 (30%), E. coli was the most frequent 60 (20%) organism isolated, followed by Proteus in 18(6%) patients. Staphylococcus and Pseudomonas was found in 6 (02%) each. These results compared to publication by Michael L. Wilson and Loretta Gaido[35] are quiet similar.

Ultrasonogram is a very useful diagnostic tool in the management of BOO. It can detect upper urinary tract dilatation, demonstrate bladder size and capacity along with post voidal residual urine volume. It is very sensitive in prostatic size evaluation and aid to detect any intra prostatic pathology. In this study all 300 patient (100%) underwent USG of KUB, Prostate and PVR measurement [Table 7]. Bilateral hydronephrotic kidneys with hydroureter were found in 21 patients (07%). Enlarged prostate with significant PVR was the commonest finding in 91 patients (31%). Enlarged prostate with nodularity was present in 12 patients (04%) and Fibrosed prostate with nodularity in 9 patients (03%). These 21 patients underwent needle biopsy of prostate and 09 confirmed as malignancy. Serum PSA measured in this 114 patient with enlarged prostate showed 21 has a level more than normal i.e. >4 ng/ml (18.42%)[Table 5].

Uroflowmetry was done in 183 patients. Q max <10 ml/s was found in 100 patient (54.64%) and Q max >10 ml/s in 83 patients (45.35%). While uroflowmetry cannot replace pressure-flow studies in the diagnosis of BOO, it can provide a valuable improvement over symptoms alone in the diagnosis of the cause of lower urinary tract dysfunction in men presenting with LUTS. The study of Reynard JM[36] provides performance statistics for Qmax with respect to BOO. Such statistics may be used to define more accurately the presence or absence of BOO in men presenting with LUTS, so avoiding the need for formal pressure-flow studies in everyday clinical practice, while improving the likelihood of a successful outcome from prostatectomy.

Retrograde urethrogram was done in 87 patients[Table 7]. Stricture or narrowing of urethra was found in all 78 patients (89.65%) of stricture urethra. 09 patients (10.34%) showed posterior urethral valve (PUV). These results were similar to the series ofSatter A M R[24]. X-ray pelvis with penoscrotal region was done in 60 patients [Table 7]. Twenty patients (45%) of them out of 39 patient of ruptured urethra had pelvic fracture. 06 patient (10%) out of 21 with carcinoma prostate showed osteosclerotic lesion in the iliac bones.

In this series, plain X-ray KUB was done in 30 patients of impacted urethral stone. Special requisition was written to include the genital region in all radiographs. Radio-opaque shadow was seen in the urethral region in all 30 patients. Nine patient had concomitant radio-opaque shadow in the bladder region as well. IVU was done to see the functional status of the kidneys in 21 cases where USG showed bilateral hydronephrotic kidneys with hydroureter.

Conclusion

The Present study on bladder outflowobstruction represents the experience of 300 cases admitted in the Urology Centre of CMH Dhaka during the period of Jan 2016 to Jun 2016. The aim of the study was to find out causes of BOO, Age incidence of various causes, pattern of clinical presentation, clinical findings, pattern of investigations prescribed and investigation findings in such cases.

Males were found to be the predominant sufferer and commonest cause of bladder outflow obstruction was benign enlargement of prostate. Bladder outflow obstruction is a common surgical problem and early diagnosis is very important to prevent complications and morbidities. Our findings of pathological changes in urinary tract due to this type of obstruction reflect the serious consequences. Therefore, careful assessment, prompt diagnosis and appropriate is essential to prevent complications.

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