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DIVERTICULUM OF THE URETER, CASE REPORT

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INTRODUCTION

Congenital diverticulum of the ureter is one of the rarest urological anomalies, and a review of literatures collects only 32 cases from foreign and 7 from Japanese literatures. Here reported is a case we recently experienced.

CASE

A 27-year-old female was first seen at the out-patient department of urology on January 12, 1960, being referred from the medical ward because of hematuria and an episode of recurrent attacks of fever. Her family history was not remarkable but carcinoma. She was II-para and had had 3 times of dilatation and curettage, otherwise had never been ill. January 20, 1960, she first developed high fever of 39.5°C five days after D. & C. associated with chill and bilateral lumbar pain. Her family physician injected Streptomycin with a temporary relief, but her temperature again elevated to 39.0°C which was also treated with Streptomycin and gradually came down this time. In February 1960, she first noted gross hematuria. Temperature at this time continued to be around 37.0°C with recurrent attacks of high fever. She was hospitalized to Himeji National Hospital during the period of March to April under the diagnosis of chronic glomerulonephritis. Urinalysis was said to show 1 plus Albumin and 1 plus RBC, but there was no edema or high blood pressure. Dec. 9, 1960, she again noticed gross hematuria after drinking beer and coffee, but it soon disappeared. She was hospitalized to the medical department on January 9, 1961 and had a urological consultation 3 days later. She had no frequency, no burning on urination, and no pain anywhere.

Physical examination revealed no abnormalities. P 76, R 17, T 36.5°C, blood pressure 130/90. Abdomen was free of rigidity, tenderness, distension or palpable mass. Urinalysis showed albumin 1 plus, sugar negative, RBC 2-3 per high power field, WBC 5-6 per high power field, a few epithelial cells, cast negative and crystal negative. Pseudomonas and alkaligenes were cultured from catheterized urine. Blood examination showed RBC 421×10^4, Hb. 83%, color index 0.98, WBC 6200 with normal differential count. Bleeding time was 4′30″, clotting time 18′, capillary resistance test 140 mm Hg

on both sides. Sedimentation rate was normal.

Blood chemistry : Fasting blood sugar 63 mg/dl., total serum protein 7.0 g/dl., total serum cholesterol 130 mg/dl., cholesterol ester 94 mg/dl., Na 143.2 mEq/L., K 4.25 mEq/L., Ca 4.66 mEq/L., and Cl 118.0 mEq/L., NPN 18.7 mg/dl., Creatinine 0.7 mg/dl..

Renal clearance study was carried out with results of eff. RPF 758 cc/min. (143%), eff. RBF 1149 cc/min. (101%), FF 14.7% (70.0%), and UF 1.66 cc/min..

PSP test was 44% (15′), 65% (30′),77% (60′) and 84% (120′). Fishberg's concentration test was also normal.

Liver function tests were as follows : icterus index 5, serum bilirubin 0.8mg/dl., thymol turbidity 3-4 u., zinc turbidity 12 u..

Cystoscopy and retrograde pyelography was first performed on 12 January. Bladder was grossly normal except for somewhat edematous vesical neck and a few spotted cysts in trigone. Both ureters were catheterized up to 20 cm. without meeting any obstruction. Indigocarmine test showed excellent excretion within 5 minutes.

KUB was normal. Retrograde pyelogram (Fig. 1.) demonstrated normal looking pyelocalyceal system on both sides with no dilatation in the upper urinary tract. In the mid-ureter on the right, there was an unusual structure extending upwards just laterally to the ureter. A ureteral catheter was seen in this pouch-like structure the outline of which was well delineated on the film. Extravasation could be easily ruled out and a diagnosis was made as diverticulum of the right ureter. The patient was then transferred to Urology.

Excretory pyelogram failed to demonstrate above-mentioned diverticulum. Retrograde study was repeated only on the right side with an attempt to demonstrate diverticulum by taking a pyelogram with a ureteral cathter placed at 10 cm. from the ureteral orifice, however, this also failed to give us a picture of diverticulum.

This fact tells us how it is incidental to disclose such an anomaly as ureteral diverticulum.

Exploration of the right ureter was carried out on 27 February. With the patient placed in the supine position, with the right side a little elevated, a pararectus incision was made extending from the level of the umbilicus to the level of the anterior superior iliac angle. The incision was deepened in the usual manner, then the peritoneum was retracted medially. The ureter was found to be partly duplicated in such a way as running in pararell within the common ureteral sheath. The mid-portion of the ureter was mobilized to see anatomical situation exactly. One of the two ureteral structures was noted to have a blind end where no rudimentry kidney was recognized. A traction suture was placed on the tip of the diverticulum which was bluntly freed down to the level of the iliac vessels where it conjoined to the original ureter with normal caliber of communicating lumen. The diverticulum was amputated from the ureter, and the opening was primarily closed with three interrupted sutures of 000 catgut. Postoperatively, the patient did well and left the hospital in two weeks.

Removed specimen was a ureter-looking structure of 10 cm. long with normal caliber. Complete lumen was recognized through the entire length. No tumor or hemorrhage was seen inside the diverticulum (Fig. 2).

Histologically, the wall of diverticulum complizes transitional epithelium, complete three layers of smooth muscle and periureteral sheath of connective tissue. There is slight lymphocytic infiltration in the submucosa associated with mild inflammatory proliferation of the mucosal epithelium (Fig. 3).

IVP taken on the 8 th postoperative day showed satisfactory excretion and drainage without any evidence of hydronephrosis or extravasation.

DISCUSSION

Diverticulum of the ureter might be conveniently classified as follows.

A. Congenital (true) diverticulum
   1. Type of blind-ending bifid ureter
   2. Type of globular sac

B. Acquired (false) diverticulum
   1. Type of multiple diverticulosis
   2. Type of globular sac

Both A. 1. and A. 2. are thought to be of the same embryologic origin. It is believed that one of the divided ureteral stalks ceases to develop in 3 to 4 weeks of fetal life and gives rise to such a structure as diverticulum.

B. 1. is often inflammatory in nature, whereas B. 2. is due to trauma or stricture. Differential diagnosis should be strictly made in regard to similar conditions of the ureter as partial hydroureter, ureterocele, blind-ending ureter opening in the bladder, and a communication of ureter with diverticulum of the bladder.

A review of literatures presents us 40 cases of congenital diverticulum of the ureter 32 being foreign and 8 domestic. They can be tabulated as follows.

Table 1. 40 cases of congenital diverticulum of the ureter

		Foreign (32)	Domestic (8)
Sex	Male	11	3
	Female	21	5
Side	Right	14	7
	Left	17	1
	Bilateral	1	0
Type	Blind-ending bifid ureter	20	4
	Globular sac	12	4
Site of Diverticulum	UP junction to upper ureter	9	1
	Mid-ureter to sacroiliac joint	14	5
	Juxtavesical	9	2

Our case is also included.

Of 40 cases reported so far, definite diagnosis was made preoperatively in 28 by retrograde pyelography and 4 by IVP. Seven cases were incidentally found at operation. Their treatments consist of 17 diverticulectomy, 10 nephrectomy, 7 no surgery, 1 ureteral dilatation, 1 removal of stone, 1 implantation of the ureter and 3 unknown.

Here is shown a table of 8 cases of true diverticulum of the ureter reported in Japanese literatures (Table 2).

CONCLUSION

Diverticulum of the ureter is a condition not so extremely rare but seldom disclosed because the patient with di-

Table 2. Congenital diverticulum of the ureter reported in Japan

No.	Author	Sex	Age	Side	Site	Size (cm.)	Presenting Symptom	Diagnostic Method	Treatment	Literature
1	Takahashi Miyoshi 1929	M	39	R	UP Junction	Index-finger tip	Fever	RP	Conservative	Jap. J. Derm. & Urol. 29 : 711, 1929
2	Takahashi Tsuchiya 1936	M	18	R	L_5—L_1	15	Eunuchoid	IVP	Conservative	Jap. J. of Urol. 25 : 614, 1936
3	Iwashita et al. 1940	M	37	R	L_4—L_2	6~7	Pyelitis Cystitis	RP	Conservative	Jap. J. of Urol. 29 : 210, 1940
4	Tada Shintani 1955	F	32	R	Lower Ureter	3.5×1.5	Urinary stasis	Operation	Unknown	Acta Urol. 1 : 271, 1955
5	Momose et al. 1957	F	50	R	7 cm. from U.O.	2.2×1.0	Pain Cloudy urine	RP	Nephroureterectomy	Derm. et Urol. (Japan) 11 : 1079, 1957
6	Kanazawa Segawa 1958	M	62	L	Juxta-vesical	Hen-egg	Pain in loin Intermittent hematuria	RP	Partial Ureterectomy with reimplantation into bladder	Jap. J. of Urol. 49 : 388, 1958
7	Takai Horiyone 1960	F	57	R	L_5	0.3×0.8	Pain in lower abdomen	RP	Diverticulectomy, Ureteroplasty (End-to-end anastomosis)	Jap. J. of Urol. 51 : 825, 1960
8	Tomoyoshi et al. 1961	F	27	R	Just above the iliac artery	10.0	Hematuria	RP	Diverticulectomy	This article

verticulum may be asymptomatic unless there is associated urinary tract infection. Moreover, a routine urological examination might frequently fail to demonstrate diverticulum as we experienced. Diverticulum often facilitates urinary tract infection causing urinary stasis and/or extrinsic pressure on the ureter. Diverticulectomy is usually a choice of treatment with ureteroplasty if necessary.

SUMMARY

Diverticulum of the right ureter was found in a 27-year-old female with recurrent pyelonephritis probable due to the presence of diverticulum, which was surgically removed and 10 cm. in length being the type of blind-ending ureter arising at the level of iliac vessels and extending upward just leaterally to the ureter in pararell with it.

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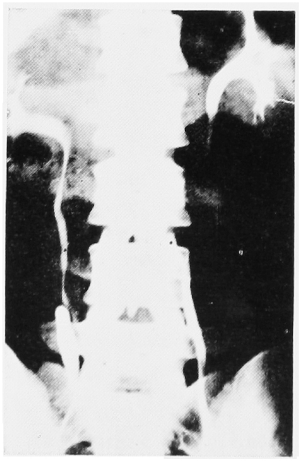


Fig. 1. Retrograde pyelogram. Diverticulum of the right ureter is demonstrated as a pouch formation laterally to the ureter.

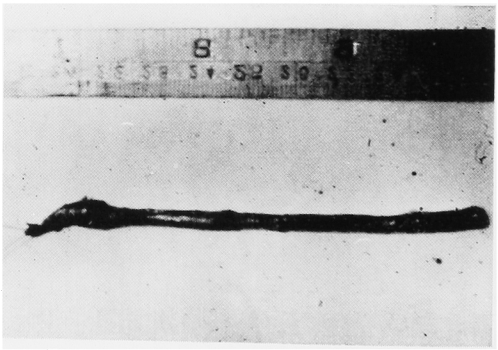
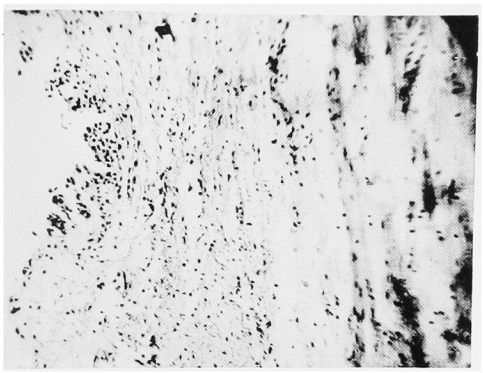


Fig. 2. Gross specimen of removed diverticulum. Its tip is on the left side.



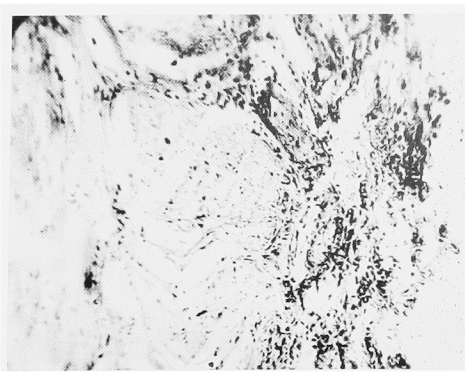


Fig. 3. Photomicrogram of the wall of diverticulum.

Fig. 3. (A) Transitional cell epithelium and inner longitudinal layer of the smooth muscle. Slight lymphocytic infiltration in the submucosa with mild epithelial proliferation.

Fig. 3. (B) Median circular and outer longitudinal muscular layer. The latter is very thin.

尿管憩室の1例

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先天性（真性）尿管憩室は極めて稀に接する泌尿器科的先天異常のひとつであつて，現在のところ外国文献より32例，本邦文献より8例（本症例を含む）を集計しうるにすぎない．我々の症例は腎盂腎炎にもとづくと思われる血尿を主訴とせる27才の女子患者に於て，逆行性ピエログラムを行い，偶然にも尿管カテーテルが尿管憩室内に入り，発見し得たもので，手術により，腸骨動脈交叉部直上より分岐して本来の尿管の外側をこれと平行して上向する重複尿管盲管型の尿管憩室を摘除した．標本は長さ 10.0cm，太さは正常尿管大で，全長に亘つて管腔を有し，組織学的にも完全な内縦，中輪，外縦の筋層構造と移行上皮を有し軽度の憩室炎を伴なつていた．本邦報告例中，長さに於て高橋　土屋の 15 cm に次ぐ2番目のものであり，重複尿管盲管型尿管憩室に対するものとしては最初の憩室摘除報告例である．

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