Case Report

Milk of Calcium Renal Stone and Renal Pelvic Cancer associated with Hydronephrosis

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A 56-year-old male was admitted to a hospital because of gastric ulcer in 1967, and by chance he was diagnosed right milk of calcium renal stone associated with hydronephrotic kidney by plain abdominal X-ray film. In 1979, he was admitted to our hospital complaining of hematuria, and died from renal pelvic cancer on the 49th hospital day. Milk of calcium renal stone associated with hydronephrotic kidney is rare, with only 13 cases were reported previously. This is the first report, a case of milk of calcium renal stone associated with hydronephrosis died from renal pelvic cancer.

Key Words: Milk of calcium renal stone, Hydronephrosis, Renal pelvic cancer

Milk of calcium renal stone is a relatively rare disease, which was first described by Howell¹⁾ in 1959. Since then many reports have appeared, and most of these articles showed milk of calcium in calyceal diverticula or in pyelogenic cysts. Only 13 cases of milk of calcium renal stone associated with hydronephrotic kidney have been reported in English and Japanese literatures (Table 1)^{2, 3, 5-15)}.

The purpose of our report is to describe a such rare case as with renal pelvic cancer and characteristic findings of ultrasonography and computed tomography.

CASE REPORT

A 68-year-old male was admitted to Kyorin University Hospital on October 26th 1979 complaining of hematuria and generalized edema. The patient had a thoracoplasty due to left pulmonary tuberculosis in 1952. Milk of calcium renal stone was suspected in right kidney by abdominal X-ray examination in 1967 when he was first admitted to other hospital because

of gastric ulcer. Since July 1978 he had noted hematuria occasionally. In July 1979 a small hard mass appeared in his anterior neck which increased gradually in its size. In July 1979 edema on extremities and nocturnal dyspnea developed and became worse progressively.

Physical examination on admission revealed a markedly anemic and emaciated man, appearing chronically ill. A firm tumor 2 cm in diameter was palpable on anterior neck. Functional systolic murmur was audible at apex (Levine III/VI) and moist rales in both lung fields. Liver was palpable 6 cm below right costal margin. Bimanual palpation revealed a elastic firm mass sized 10 × 15 cm in diameter with irregular margin in right flank.

A complete blood count 4.9 g/dl hemoglobin; white blood cell count was 5,400 with 77 per cent neutrophils; and platelet count was 326,000. Urinalysis revealed a specific gravity of 1.023, pH 6.0, 2+ protein, numerous red blood cells, and 10-12 white blood cells in one visual field in urinary sediment. Urine culture showed no *Mycobacterium tuberculosis*. Blood chemistries

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Table 1. Milk of calcium renal stone associated with hydronephrosis

REPORTER	REPORT YEAR	AGE	SEX	SITE	SYMPTOMS	COMPLICATIONS	THERAPY
	1967	65	F	right	flank pain	renal stone gross hematuria epidermoid ca.	nephrectomy
	1969	65	M	left	none	none	nephrectomy
	1971	29	M	left	flank pain	hematuria	nephrectomy
	1971	43	M	left	tarry stool	none	partial nephrectomy
	1972	24	M	left	flank pain	hematuria	pyeloplasty
	1973	43	M	left	abdominal pain	none	nephrectomy
	1973	28	F	right	none	proteinuria	nephrectomy
	1973	49	M	left	flank pain	none	pyeloplasty
	1973	49	M	right	flank pain	none	
	1974	43	M	left	tarry stool	ureteral stone	nephrectomy
	1977	65	M	left	hematuria	renal stone	nephrectomy
	1978	42	M	left	flank pain	gross hematuria	nephrectomy
	1985	28	M	bilat.	bilateral flank pain	renal stones	nephrolithotomy
	1986	68	M	right	general malaisia edema gross hematuria	renal stone renal pelvic ca.	Fluorouracil MMC Cytosine arabinoside

showed normal BUN, and serum creatinine was in normal range. Serum electrolytes were within normal range except for inorganic phosphate 3.0 mg/dl. Arterial pH was 7.41, arterial O₂ saturation 91.9% and bicarbonate 30.5 mmol/l plasma.

Plain abdominal roentgenogram on admission showed a triangled stone and opeque fluids levels due to "milk of calcium" in the right abdomen in supine position (Fig. 1), and multiple semilunar shadows in erect position (Fig. 2). The left kidney showed no abnormal findings. Abdominal echogram showed some cystic patterns containing fluid levels with acoustic shadows in enlarged right kidney (Fig. 3). Abdominal CT scan at navel level showed multiple semilunar high density images in the right abdomen (Fig. 4).

Urinary cytology showed atypical transitional cells (class V) and histological findings of the subcutaneous tumor of the neck revealed skin metastasis of poorly differentiated adenocarcinoma (Poorly differentiated adenocarcinoma was presumed as pleomorphism of transitional cell carcinoma). Selective right renal arteriogram demonstrated encasement of right renal arteries and hypervascularity in the upper part and pelvis of the right kidney (Fig. 5). The diagnosis of right

Fig. 1. Abdominal plain X-ray film in supine position shows a triangled stone shadow and several oval shadows in right abdomen.

Fig. 2. Abdominal plain X-ray film in erect position shows a triangled stone shadow and several semilunar shadows in right abdomen.

Fig. 3. Abdominal echogram shows marked hydronephrotic kidney and localized collections of horizontal high level echoes with acoustic shadows within the lumen of the dilated renal calyx.

Fig. 4. Abdominal CT scan shows right hydronephrotic kidney and high density fluid level in it.

Fig. 5. Selective renal arteriogram shows encasement of renal arteries and hypervascularity in the upper part and pelvis of right kidney.

renal pelvic transitional cell carcinoma with its skin metastasis was made.

The patient was treated with Fluorouracil 250 mg, Mitomycin C 2 mg and Cytosine arabinoside 20 mg intravenously. Frequent blood transfusion was required because of massive hematuria. The patient died on the 49th hospital day.

PATHOLOGY

The necropsy specimens of right kidney showed hydronephrotic kidney $16 \times 10 \times 5$ cm in size (Fig. 6). The color of the surface of the kidney was blackish red, and the punctured content was bloody. Upper half of the cut specimen showed distended calyces encrusting many calcium stone, 0.5 mm to 10 mm in diameter. Papillomatous tumor sized $2 \times 2 \times 2.5$ cm was recognized in the

Fig. 6. The gross specimen of right kidney shows marked hydronephrotic kidney.

Fig. 7. The histology of the tumor of calyx shows transitional cell carcinoma.

Fig. 8. The histology of the neck tumor shows undifferentiated carcinoma in the subcutaneous tissue.

lower distended calyx. The histological finding of the tumor of calyx was transitional cell carcinoma (Fig. 7). The microscopic examination of neck tumor showed undifferentiated adenocarcinoma (Fig. 8). Neck tumor was thought to be the pleomorphism of transitional cell carcinoma. Chemical analysis of the stones revealed calcium phosphate (75%).

DISCUSSION

The formation of milk of calcium renal stone is an unusual phenomenon of uncertain etiology. Richter¹³⁾ pointed the significance of urinary stasis with superimposed infection for the pathogenesis of the development of this special fluids. However, infection as a requisite for formation of the fluids could not be documented by analysis of previously reported cases. To our investigation, only 30 cases in English literatures, and 40 cases in Japanese have been reported. Pomerantz⁴⁾ divided the patients into two groups; 1) cases with cysts and 2) cases with multiple collections within dilated calyces in markedly hydronephrotic kidneys^{2,3,5-15)}. Our reported case belongs to the latter group and also had renal pelvic cancer. Most cases of hydronephrotic type were almost asymptomatic. Berg²⁾ reported the first case of renal carcinoma associated with milk of calcium. In his case, a focus of squamous cell carcinoma arising from metaplastic uroepithelium was discovered in the resected kidney incidentally, and was thought not contributory to the patient's symptoms.

Clinically important point of our case is the complication of renal pelvic carcinoma which induced his death twelve years after diagnosis of milk of calcium. Very rare case of milk of calcium renal stone and renal pelvic cancer associated with hydronephrosis was reported.

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