

Modified Nephro-ureterectomy. Long-term Follow-up with Particular Reference to Subsequent Bladder Tumours

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Summary—Nephro-ureterectomy is the standard treatment for transitional carcinoma of the renal pelvis and caliceal system. In recent years a modification of the conventional two-incision technique has been described in which the intramural ureter is resected endoscopically and the remaining ureter is removed in continuity with the kidney through a single loin incision.

Twenty-one patients had their renal pelvic tumours treated by this modified technique between 1970 and 1983. Of 16 patients available for analysis, 37.5% subsequently developed bladder tumours. It was concluded that this modified technique has no greater incidence of subsequent bladder tumour development than the conventional technique of nephro-ureterectomy, whilst giving considerable benefit to the patient.

Abercrombie (1972) described a technique in which the intramural ureter was resected transurethrally and the kidney and ureter removed through a single loin incision. Over the last 17 years this “modified nephro-ureterectomy” has been adopted as standard technique in this department for the treatment of pelvic transitional carcinoma. We report our experience with this technique for the treatment of pelvic transitional malignancy between 1970 and 1983. We have looked particularly at the incidence of subsequent bladder tumours in an attempt to determine whether the technique carries a significant risk of tumour implantation.

Patients and Methods

All patients with transitional cell carcinoma of the upper urinary tract treated by modified nephro-ureterectomy in Portsmouth between 1970 and 1983 were reviewed. Twenty-one were found to have pelvic tumours without ureteric involvement (10 men and 11 women with a mean age of 65.8 years; range 39–87).

Patients were cystoscoped under general anaesthesia and the relevant ureteric orifice identified and catheterised. The anterior wall of the intramural ureter was excised transurethrally over this catheter using a Storz 24F resectoscope, the posterior ureteric wall being resected following withdrawal of the ureteric catheter. The “circular” end of the remaining ureter was then visible in the depths of the resection. The fragments of excised ureter were evacuated and the bladder catheterised and left on free drainage. The patient was then turned into the standard “kidney position” and the loin incised to expose Gerota’s fascia. The ureter was identified in the retroperitoneum before opening this fascial envelope, and tied in continuity in its upper third in order to obliterate the ureteric lumen. Standard nephrectomy was then performed, the distal ureter being freed by blind retroperitoneal dissection and “plucked” out of the bladder in continuity with the kidney. The loin was closed with drainage and the bladder drained for 8 days. The kidney and ureter were examined histologically and the stage and grade of the tumour determined.

Cystoscopic follow-up was started 3 months after operation and continued at intervals until either the patient’s death or the present time; this gave a

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follow-up of at least 3 years. The sites of vesical tumours subsequent to modified nephro-ureterectomy were noted and treated by diathermy, trans-urethral resection, radiotherapy or cystectomy according to their stage.

Results

Fourteen patients had P1 pelvic tumours (8 well differentiated and 6 moderately differentiated). One patient had a P2 lesion, five had P3 tumours and one had undifferentiated P4 disease (Table 1). Two patients died in the immediate post-operative period, one from disseminated disease associated with a P4 pelvic tumour and the other from a perforated peptic ulcer. Three patients were found to have had bladder tumours before nephro-ureterectomy and were not analysed.

Thus 16 patients were available for analysis. Eight of the 10 patients with P1 pelvic tumours survived for 5 years but only three of the six patients with higher grade disease (P2–P4) survived this long. This gave an overall 5-year survival rate of 69%. Ten patients were followed up for 5 years and did not develop subsequent bladder tumours; two developed tumours distant from the site of ureteric resection and four had disease at the site of the ureteric scar (Table 2). In two of these four patients the vesical scars were involved as part of a multifocal disease process within 12 months: one developed a solitary tumour of the same stage and

Table 3 Modified Nephro-ureterectomy. Subsequent Bladder Tumours at Site of Ureteric Resection

Age (years)	Sex	Stage of upper tract tumour	Type of recurrence	Time of recurrence (months)	Survival (months)
72	M	P1	G1 Multifocal P1	3	30
65	M	P1	G2 Multifocal P1	12	34
76	F	P1	G1 Solitary P1	3	96
59	M	P3	G2 Solitary P4	48	54

grade as that in the renal pelvis within 3 months of nephro-ureterectomy and one developed a high grade tumour in the ureteric scar 4 years after ureteric resection (Table 3).

Discussion

Two-stage, two-incision nephro-ureterectomy with excision of a cuff of vesical mucosa has been the accepted treatment of pelvicaliceal transitional carcinoma since 1933, when Kimball and Ferris showed that ureteric stump recurrence was abolished if the whole ureter was removed *en bloc* with the kidney. This has been clearly substantiated by other series (Strong and Pearse, 1976; Murphy *et al.*, 1980, 1981) and is thought to be responsible for the better survival following total upper tract clearance (Kimball and Ferris, 1933). Whether complete ureterectomy does, however, have any influence on the incidence of subsequent transitional bladder tumours is far from clear. Williams and Mitchell (1973) showed that patients having a total ureterectomy developed half as many bladder tumours as those who had incomplete ureteric excision. These figures have, however, been disputed by other workers who have shown no increased incidence of subsequent bladder tumours after conservative surgery for low grade upper tract transitional malignancy (Strong and Pearse, 1976; Murphy *et al.*, 1980) (Table 4). Most series do, however, confirm that approximately 30% of patients develop vesical tumours after conventional nephro-ureterectomy.

Endoscopic ureteric resection as part of a nephro-ureterectomy was first described by McDonald *et al.* (1952) and popularised by Abercrombie (1972). Hetherington *et al.* (1986) expressed concern about this technique, citing two cases of early, high grade tumour in the region of the endoscopic resection in five patients. They concluded from their small series that the modified nephro-ureterectomy al-

Table 1 Pathology of Upper Tract Tumours in 21 Patients

Stage/grade	No. of patients
P1 G1	8
P1 G2	6 14
P2 G1	1 1
P3 G1	2
P3 G2	1 5
P3 G3	2
P4 G3	1 1

Table 2 Subsequent Bladder Tumours in 16 Patients

No. of bladder tumours	10
Subsequent bladder tumours:	
(i) including site of ureteric resection	4
(ii) not including site of ureteric resection	2
Total	16

Table 4 Nephro-ureterectomy. Incidence of Subsequent Bladder Tumours Dependent upon Complete, Incomplete or Modified Ureterectomy

Series	Technique employed	Subsequent bladder tumour	Recurrence (%)
Williams and Mitchell (1973)	Complete	5/17	29.5
Williams and Mitchell (1973)	Incomplete	12/20	60
Strong and Pearse (1976)	Complete	7/22	31.8
Murphy <i>et al.</i> (1980)	Complete	29/93	28
Carr <i>et al.</i> (1987)	Modified	6/18	33.3
Present series	Modified	6/16	37.5

lowed spillage of tumour-bearing urine into the deeper perivesical tissues, promoting tumour implantation and prejudicing survival.

Our results are not in agreement with their findings. Six of our 16 patients developed bladder tumours subsequent to modified nephro-ureterectomy, but two had tumours away from the resection site and two had widespread multifocal disease involving the scar. One patient did develop an invasive, high grade tumour adjacent to the ureteric bed but this was 4 years after the operation. The only patient who may have had cellular implantation following endoscopic ureterectomy developed a G1 P1 tumour 3 months after intramural resection and has enjoyed 8 years' survival to date. Our results are similar to those reported by Carr *et al.* (1987), who were also unable to find an increased incidence of tumour recurrence using modified nephro-ureterectomy. They took the additional precaution of diathermy coagulation of the ureteric lumen following resection to stop urinary spillage pending ligation of the infrapelvic ureter, irrigated the bladder with normal saline and resected a 2-cm margin around the ureteric orifice to minimise cellular implantation. The combined results of these two series appear entirely comparable with those of series in which a two-stage surgical technique was used, as far as subsequent bladder tumours are concerned. It is, therefore, more likely that the bladder tumours evident following either conventional or modified nephro-ureterectomy are manifestations of the multifocal nature of transitional carcinoma of the urinary tract (Kakizoe *et al.*, 1980; Auld *et al.*, 1984) rather than of tumour spillage and implantation.

We have found that the modified technique, using a single incision, decreases operating time and minimises discomfort to the patient without influencing the 5-year survival rate for this disease. We believe that strict adherence to operative detail (Abercrombie, 1972; Carr *et al.*, 1987), application to pelvicaliceal and not ureteric malignancy, makes

modified nephro-ureterectomy a safe procedure for the treatment of transitional carcinoma of the upper tract.

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