Transitional cell carcinoma of the upper renal tract in rubber workers

C.R. Chapple, J. Newman, J.M. O'Brien, and J. Considine

Department of Urological Surgery, East Birmingham Hospital, Bordesley Green East, Birmingham B9 5ST, UK.

Summary: We report two patients where transitional cell carcinoma of the upper urinary tract developed after occupational exposure to known carcinogens, in the rubber industry. Although carcinoma of the bladder is well recognized in this context, to our knowledge, this association has not been reported previously.

Introduction

The concept of neoplastic induction of the lining of the urinary tract as a consequence of industrial exposure to certain chemicals is now widely recognized. Following on from the work of Case & Hosker (1954), it is now undisputed that people who are exposed to certain aromatic amines used as antioxidants, whilst working in rubber processing prior to 1949, have an increased incidence of bladder tumours. It has therefore been assumed that, although rare, primary tumours of the renal pelvis and ureter are more likely to develop in this group of the population (Latham & Kay, 1974). We have, however, been unable to locate any reported cases of urothelial tumours of the upper renal tract in rubber workers.

Case reports

Case 1

A 51 year old man presented with haematuria. From the age of 26–30 y he had worked in the production of rubber. Radiological investigations demonstrated a filling defect in the lower 5 cm of the left ureter. A cystoscopy was normal. A left lower ureterectomy with re-implantation was performed. Histological examination confirmed a transitional cell carcinoma confined to the wall of the ureter. Regular follow-up was continued and 5 y later he developed bladder tumours, initially low grade and controlled with cystodiathermy. Subsequently they became high grade and a course of radiotherapy to his bladder was administered with the induction of a 10 y remission. Fifteen years after initial presentation, he developed

extensive unresectable pelvic disease. Therefore, a urinary bypass was fashioned via cutaneous ureteros-tomy. His disease continued to progress and he died 6 months later. Post-mortem examination confirmed the presence of extensive metastatic deposits of transi-tional cell carcinoma.

Case 2

A 61 year old man presented with haematuria. He had worked in the production of rubber for 6 y in the 1940s. An intravenous urogram and retrograde studies demonstrated a filling defect in the left renal pelvis (Figure 1). A cystoscopy was normal. A left nephroureterectomy was carried out and histological examination demonstrated a superficially invading transitional cell carcinoma (Figure 2). A year later bladder tumours were first noticed and controlled with cystodiathermy for 6 y at which stage a course of radiotherapy was administered. However, a total cystectomy subsequently became necessary in view of uncontrollable bleeding. Two years later he developed transitional cell tumours in the bulbar urethra which were controlled by urethros-copic diathermy. Ten years after first presentation he died as a consequence of recurrent tumour, and post-mortem examination revealed extensive transitional cell carcinoma in the pelvis with metastatic deposits in the liver, but no residual urethral tumour. The right upper urinary tract was normal.

Discussion

Primary transitional cell carcinoma of the renal pelvis is an uncommon condition, with an incidence in the general population of 0.6–0.7 per 100,000 (Latham &

Figure 1 Intravenous urogram demonstrating a filling defect in left renal pelvis with associated pelvi-calyceal obstruction.

Kay, 1974). Carcinoma of the ureter is even more uncommon and as demonstrated by our first case report, usually involves the lower ureter (Smith, 1981). In a situation akin to that encountered in the colon, once the urothelium has produced a tumour, although its subsequent activity may be unpredictable, the likelihood of it producing a further tumour is increased (Willis, 1960).

The aetiological factors responsible for the development of carcinoma of the renal pelvis and ureter are poorly defined; much of the difficulty here can be attributed to the rarity of these conditions. There is a recognized significant association between the de-

Figure 2 Tumour of the renal pelvis. Grade I-II papillary transitional cell carcinoma. H&E $\times 32$.

velopment of a carcinoma of the bladder subsequent to exposure to certain dyes, petroleum intermediates and heavy cigarette consumption (Cole *et al.*, 1971; Clayson, 1976). Therefore, as the renal pelvis, ureter and bladder are lined by similar epithelium with a common embryological origin, it has been suggested that similar agents could be important in the aetiology of transitional cell carcinoma of the renal pelvis and ureter. Support for this hypothesis in an industrial setting is provided by the study of 24 dye workers with urothelial neoplasia reported by Poole-Wilson (1969). It should, however, be emphasized that there were only two primary ureteric tumours and one primary renal pelvic tumour in this group of patients. Both of the patients discussed here developed their tumours 30 y after occupational exposure to a known carcinogen, the rubber compounding ingredient Nonox S, a reaction product of 1-naphthylamine, 2-naphthylamine and acetaldehyde. Their subsequent clinical course was characterized by a poor prognosis with the relentless development of further foci of transitional cell carcinoma of the urinary tract.

References

- CASE, R.A.M. & HOSKER, M.E. (1954). Tumour of the urinary bladder as an occupational disease in the rubber industry in England and Wales. *British Journal of Preventive and Social Medicine*, **8**, 39.
- CLAYSON, D.B. (1976). Occupational bladder cancer. *Preventative Medicine*, **5**, 228.
- COLE, P., HOOVER, R. & FRIEDEL, G.H. (1972). Occupational and lower urinary tract cancer. *Cancer*, **29**, 1250.
- LATHAM, H.S. & KAY, S. (1974). Malignant tumours of the renal pelvis. *Surgery, Gynecology and Obstetrics*, **138**, 613.
- POOLE-WILSON, D.S. (1969). Occupational tumours of the renal pelvis and ureter arising in the dye making industry. *Proceedings of the Royal Society of Medicine*, **62**, 93.
- SMITH, D.R. (1981). In *General Urology*, 10th Edition. p. 288. Lange Medical Publications: Los Altos, California.
- WILLIS, R.A. (1960). *Pathology of Tumours*, 3rd Edition. p. 469. Butterworth: Washington D.C.