Outflow obstruction and bladder stones in Kelantan

Graham McAll, FRCSEd,
Lecturer.

Lim Kean Ghee, MBChB,
Medical Officer.

Rex Edward, FRCSEd, FRCSE,
Lecturer.

Department of Surgery
Hospital Universiti Sains Malaysia
16150 Kubang Kerian, Kelantan, Malaysia.

Summary

Bladder stones in men are thought to be almost exclusively due to outflow obstruction. We studied the incidence of operations for urinary outflow obstruction and bladder stone to establish the relationship between these two conditions in Kelantan. In only 48 (31%) of 154 men undergoing removal of bladder stones was a procedure for outflow obstruction performed. Thus the remaining 69% had no clinical obstruction to account for their stones. Bladder stones were more common in prostatectomy patients than expected (42/193: 22%). We suggest that other causes may be important in the aetiology of bladder stones in Kelantan.

Key words: Bladder calculi, prostatectomy, urethral obstruction.

Introduction

Lower urinary tract stone disease is much more common in Kelantan than in the West.[1] This is in keeping with the finding that bladder stones are common in the belt from North Africa to Indonesia.[2] However, unlike many reports which find them common among children,[3] in Kelantan it is the men who are most affected.[1]

Adult bladder stones in developed countries are thought to be related almost exclusively to outflow obstruction.[4] We therefore sought to examine the relationship of bladder stones in Kelantan to this factor. In a patient with bladder stone, urethroscopy is the main tool to assess whether there is an associated obstructing lesion which needs simultaneous treatment. As the stone itself causes outflow obstruction, pre-operative tests are less useful. Post-operatively residual obstruction is assessed clinically and by flowmetry, intravenous urography, and ultrasonic or catheter measurement of the residual urine after micturition. However flowmetry is not yet available here and most patients who had undergone bladder stone surgery did not have post-operative urography or measurement of the residual urine.

Even with full assessment it may not be possible to determine preoperatively the relative contributions of stone and, say, benign prostatic hypertrophy to obstruction. We decided therefore to study the association and cross-over between procedures performed for outflow obstruction and those for lower tract stones. This was possible because during the period studied such operations were only carried out in two hospitals in Kelantan.

Materials and methods

Operation records from Hospital Universiti Sains Malaysia and General Hospital Kota Bharu were examined retrospectively from June 1984 to December 1986. The details of patients undergoing procedures for obstructive conditions of the lower urinary tract were noted. These included all operations for urethral strictures such as urethral dilation and urethrotomy, and all forms of prostatectomy. Circumcisions are performed routinely in the community in adolescence, the few occurring in hospital, usually for phimosis, were ignored. All patients undergoing surgery for lower urinary tract stones over the same period were noted. Patients undergoing multiple urethral dilations were counted once.

Incidence figures were based on the known population figures for Kelantan of 1980 and calculating on a 2.6% growth rate per year. Thus the population for Kelantan for 1985 was reckoned as 1,010,444.

Results

Three hundred patients underwent procedures for outflow obstruction during the period examined and 193 of these had prostatectomies. This gives an operative incidence for prostatectomy of 7.4 per 100,000 per year. One hundred and eleven of the 300 had surgery for urethral strictures. Four patients had both a prostatectomy and a procedure for stricture and so are included in both subtotals. Fig. 1 shows the age distribution of the prostatectomy patients and Fig. 2 shows the age incidence for prostatectomy. Fig. 3 shows the age distribution of the 169 patients who had bladder stones removed and the 15 patients who had urethral stones removed during the same

FIGURE 1

AGE DISTRIBUTION OF PROSTATECTOMY PATIENTS

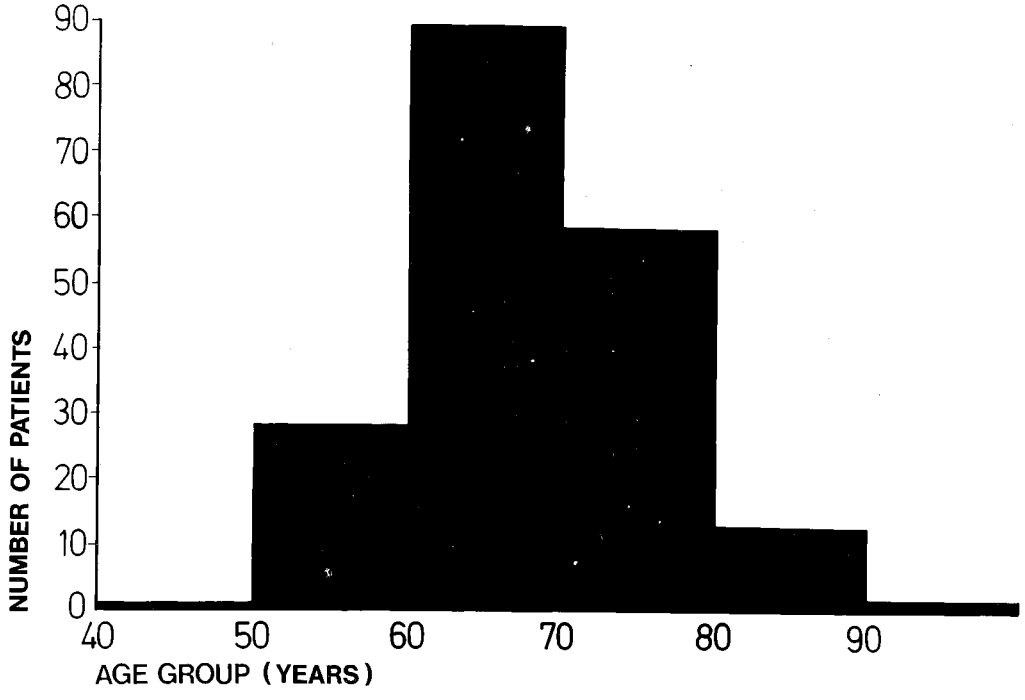


FIGURE 2

AGE INCIDENCE OF PROSTATE SURGERY PER 100,000 MEN

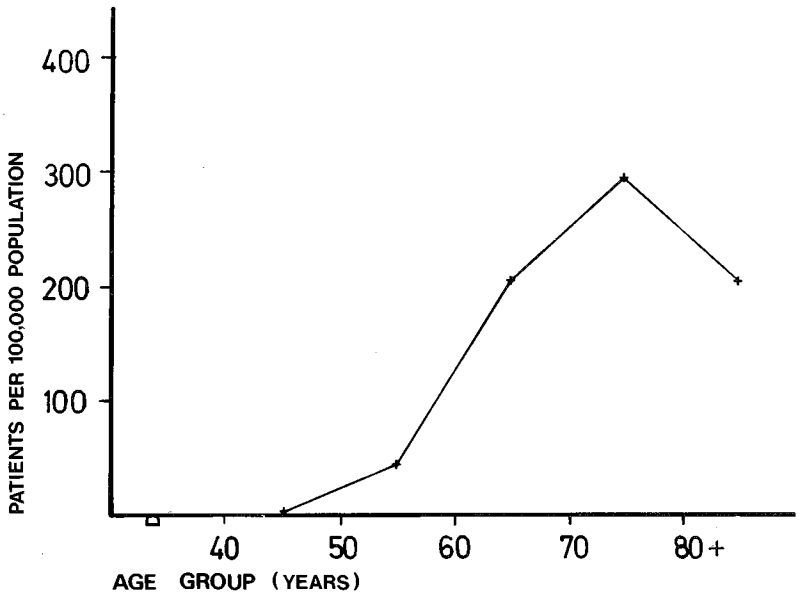
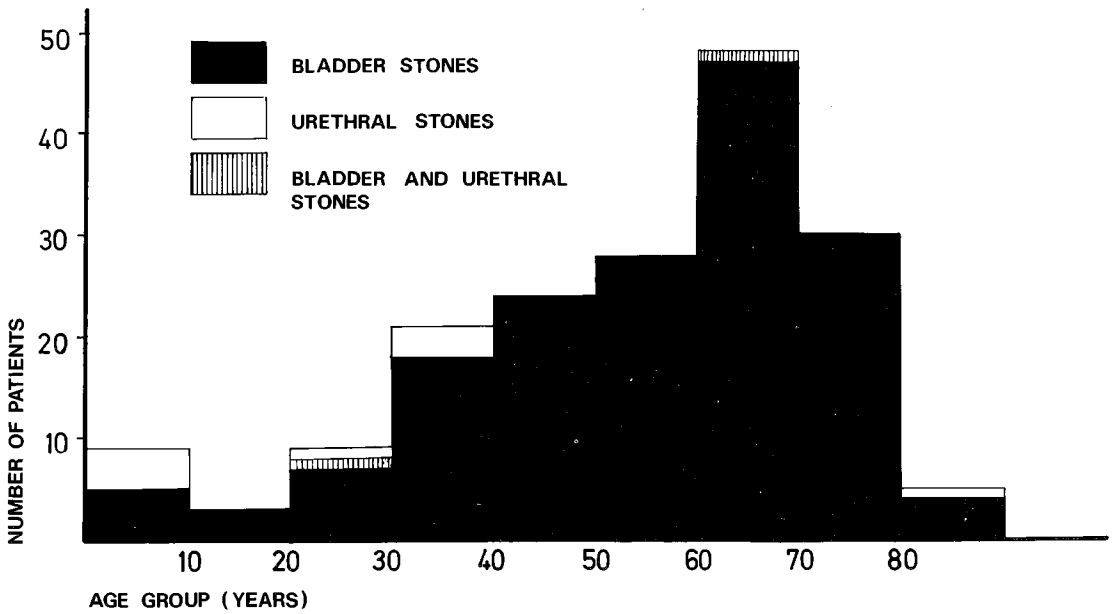


FIGURE 3

AGE DISTRIBUTION OF PATIENTS WHO HAD LOWER LOWER URINARY TRACT STONE SURGERY



period. Both figures include the two patients who had a combination of bladder and urethral stones. Only seven of the bladder stone patients were female.

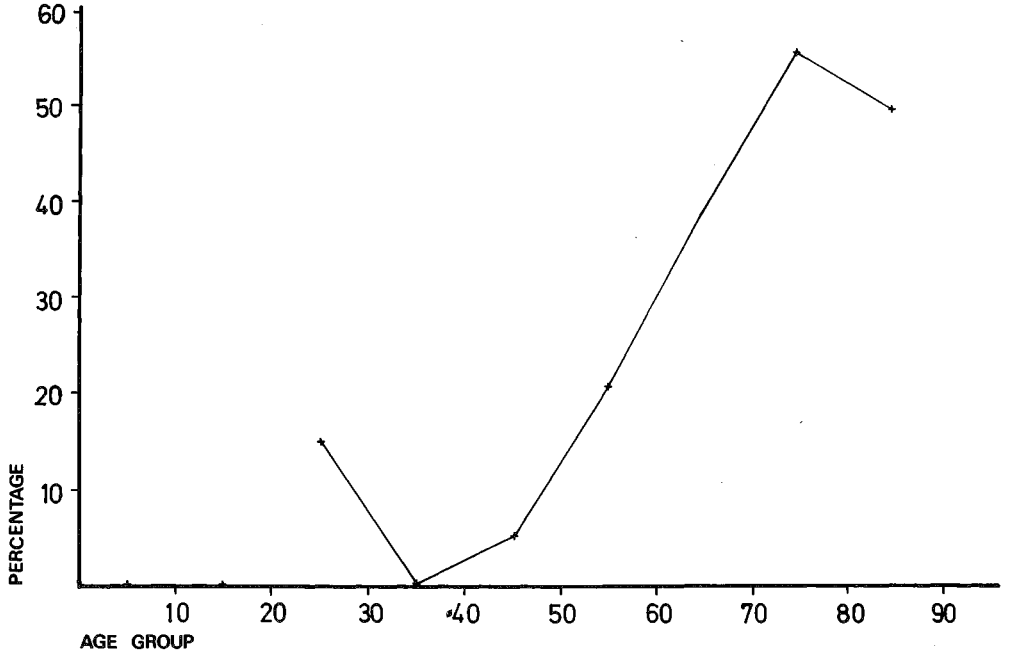
Of the 300 patients who had outflow obstruction surgery, 52 (17%) had lower tract stones. Forty-two (22%) of the prostatectomy patients required simultaneous removal of bladder stones. One hundred and fifty four of the 169 patients with bladder stones were men over 19 years of age, and 48 (31%) of these also had a procedure for outflow obstruction. The 42 prostatectomy with bladder stone patients were all over 39 years old and constituted 34% of the 124 men with bladder stone in this age group. Seven patients had bladder stone surgery with procedures for strictures; this figure includes the one patient who had surgery for bladder stone together with prostate and stricture. The proportion of patients with stones and another cause of outflow obstruction rises with age (Fig. 4). Of the 15 patients with urethral stones, four had urethral strictures and none had a prostatectomy. Four of this 15 were children and in these children there were no strictures.

Discussion

It is well accepted that stasis from outflow obstruction predisposes a patient towards developing bladder stones.[4] We wanted to estimate the extent of this factor as a cause in our patients. In this series 69% of men with bladder stones had no other procedure than removal of their stone. Outflow obstruction was only noted in the remaining 31%. This result contrasts sharply with that of Taylor and Bowyer from Perth,[5] who found outflow obstruction present in 26 out of 33 men with bladder stone (79%). At surgery for bladder stone, urethroscopy is used

FIGURE 4

PERCENTAGE OF PATIENTS WITH BLADDER STONES WHO ALSO HAD SURGERY FOR OUTFLOW OBSTRUCTION



to check that there is no stricture or prostatic enlargement. This check is, to some extent, subjective and the indications for an additional procedure could be compromised. With this in mind we checked operative records for six months after the study period to look for patients who had only had stones removed in the first operation and to see if they returned later for an operation for outflow obstruction which had been missed the first time round. We found none. If outflow obstruction was a cause of stone in the 106 adult males who only had bladder stone surgery, it must have been subclinical and not noted at urethroscopy. The similarity of the age incidence of outflow obstruction and of stone disease is compatible with this possibility. Post-operative flowmetry or measurement of residual urine in these patients would be useful to clarify this issue.

Bladder stones in children are widely thought to be due to metabolic factors rather than obstruction. No obstruction was found in our eight males under 20 years. Increased concentrations of urinary solutes, reduced amounts of the vesical inhibitors of nucleation, neurogenic bladder, foreign body, diverticulum, radiotherapy and cystocele have all been reported as associated with adult bladder stone.[5,6] Nutritional factors and persistently low urinary pH have been noted in childhood bladder stone.[7] Studies of these factors in Kelantanese patients are required. We suspect hyperuricaemia, dehydration and chronic proteinuria may be additional factors in our patients and we are examining these at present.

Of all our prostatectomy patients 22% had bladder stones, whereas Badenoch[8] found bladder stones in only 3% of his prostatectomy patients. That our prostatectomy patients have more stones than their counterparts in the West might be explained by either more advanced prostatic disease at the time of surgery or to an increased tendency to stone formation for other reasons. Certainly the incidence of prostatectomy in this series is lower than that in the West. Lytton et al. from Yale[9] found an age incidence of 10 per 1000 in the 70–79 years age group. This is more than three times the age incidence for the same group in this study (3 per 1000, Fig. 2).

It will be interesting to see what happens to the relative incidences of prostatectomy and bladder stone in this community over the next ten years. We suggest that simple outflow obstruction doesn't adequately explain the bladder stones seen in this community, which are unusually common both in prostatectomy patients and in those men without other obvious obstructing lesions.

Acknowledgements

We thank Mr. Hariraja of the General Hospital, Kota Bharu for permission to review his operative records and Professor NJ Blacklock for his encouragement and advice. This study was funded by a Universiti Sains Malaysia research grant.

References

1. Lim KG, Edward RH, McAll GLG, Mya Thaung, Nor Akmal Wahab, Arumainayagam G: Urinary stones in Kelantan, Malaysia – a two year review. Sing Med J 1988; 29 : 353–6.

2. Halstead SB: Studies on the etiology of idiopathic bladder stone disease. In: Van Reen R, ed. Idiopathic urinary bladder stone disease. Forgarty International Centre Proceedings No. 37, DHEW Publ. No. (NIH) 77–1063, 1977 : 121–34.

3. Valyasevi A, Halstead SB and Dhanamitta S. Studies of bladder stone disease in Thailand. VI. Urinary studies in children 2–10 years old, resident in hypo- and hyper-endemic areas. Am J Clin Nutr, 1967; 20 : 1362.

4. Fitzpatrick JM: Ureteric and bladder calculi. In: Whitehead HN, Hendry WF eds. Textbook of genito-urinary surgery. New York: Churchill-Livingstone. 1985 : 691.

5. Taylor TA, Bowyer RC: Bladder and prostatic calculi – clinical presentation and composition. In Brockis JG, Finlayson B, eds. Urinary calculus, International Urinary Stone Conference. Massachusetts: PSG Publishing Company Inc. 1981 : 57–63.

6. Edyvane KA, Ryall RL, Marshall VR: The contribution of bladder secretions to the crystal growth inhibitory activity of urine. In: Ryall RL, Brockis JG, Marshall VR, Finlayson B, eds. Urinary Stone, Proceedings of the Second International Urinary Stone Conference, Singapore, 1983. Melbourne: Churchill Livingstone. 1984 : 198–201.

7. Ryall RL, Brockis JG, Marshall VR, Finlayson B, eds. Urinary stone, Proceedings of the Second International Urinary Stone Conference, Singapore, 1983. Melbourne: Churchill Livingstone. 1984 : 4.

8. Badenoch AW: Manual of Urology (2nd Edn), William Heineman, London. 1974 : 361.

9. Lytton B, Emery JM and Harvard BM: The incidence of benign prostatic obstruction. J Urol. 1968; 99 : 639–45.