ELSEVIER

THE CEYLON MEDICAL JOURNAL

Established 1887

The Official Publication of the Sri Lanka Medical Association

Volume 49, No. 2, June 2004

Quarterly ISSN 0009-0875

Continued Overleaf

Urinary stone disease in Sri Lanka

Enthusiasm for sophisticated interventions should be matched by efforts for prevention

Stones in the urinary tract have plagued humans since the beginning of recorded history. Archaeologists have uncovered urinary stones in the mummified remains of Egyptians estimated to be 7000 years old [1]. It is a major problem in present urology practice. It leads to absenteeism from work, frequent visits to hospitals, recurrent urinary tract sepsis and deterioration of renal function in many sufferers [1,2]. About 2% to 5% of Asians develop renal stones in their lifetime [3]. Although such data is not available for Sri Lanka, the fact that nearly 3000 patients are treated with extra-corporeal shock wave lithotripsy (ESWL) at the National Hospital of Sri Lanka alone every year is an indirect indicator of the size of the problem [4]. Hence proper management of stone disease is of great importance both socially and economically.

About 10% to 20% of all kidney stones may warrant surgical removal [5]. The past two decades have shown rapid progress in the surgical treatment of urolithiasis. Improved radiological imaging techniques, endourological devices and shock wave lithotripsy (EWSL) have revolutionised patient care, allowing efficient stone removal with a significant reduction in postoperative pain, transfusion rates, surgical wound related complications and convalescence periods compared to the open alternatives. But there are important fiscal implications of these technologies especially relevant in resource-poor settings. The cost of purchasing and maintaining such equipment can be a significant burden to the health budget [6]. This is further aggravated by the higher stone recurrence rate after minimally invasive techniques (38%, 41% and 49% following open surgery, percutaneous nephrolithotomy and ESWL, respectively) [7,8]. In resource-poor settings open surgery still appears to be cost effective in certain subsets of patients [9]. The assessment of alternative technologies from this perspective is important to optimise facilities within the available resources and should be a regular feature of clinical practice, although other considerations may finally determine which technology is used.

It is well known that kidney stones have a tendency to recur. Without medical treatment the risk of stone recurrence in an individual patient is 40% within 3 years, 75% within 10 and 98% within 25 [7]. This is important as first episodes of renal stone occur commonly in young people (20–40 years). Metabolic abnormalities responsible for stone recurrence are currently identified in 97% of evaluated patients and the remission rate of medical prophylaxis in calcium stone formers is about 80% [10, 11].

Published by

Elsevier
A Division of Reed Elsevier India Pvt. Ltd.
17-A/1, Main Ring Road
Lajpat Nagar IV
New Delhi - 110024, India
Tel: +91-11-2644 7160-64
Fax: +91-11-2644 7156
Website: www.elsevier.com

Printed by

Saurabh Printers Pvt. Ltd.
NOIDA
India

The Sri Lanka Medical Association
Wijerama House
6, Wijerama Mawatha
Colombo 7
SRI LANKA

Tel: +94 11 2693324
Fax: +94 11 2698802
Internet home page
http://www.slmaonline.org/cmj
e-mail: SLMA@eureka.lk

Allowing patients to form new stones without providing preventive medical treatment is an expensive way of management since each patient will have, on average, seven stone episodes during a lifetime [7].

In order to provide the stone former with medical advice it is essential to identify the cause for stone formation. Then it becomes possible to design an efficient treatment programme to achieve stone clearance, prevent recurrent stone formation and progressive growth of residual fragments. Renal stones originate from various endocrine and metabolic disturbances, and from environmental and nutritional aberrations. Most stone formers appear to have a metabolic disturbance, which makes them more "sensitive" to certain dietary habits and environmental factors. Hence medical management of a stone includes correction of dietary habits, metabolic defects or both. Avoidance of unfavourable environmental factors would be of added benefit, if that is feasible.

The 70% to 85% of urinary calculi are composed of calcium salts (calcium oxalate in the majority); the remainder are composed of struvite (3–15%), urate (2–18%) and cystine (1–2%) [7,12]. The chemical make-up of the stone is relevant since prevention of recurrences varies somewhat depending on the type of stone. For this both quantitative and qualitative analysis of the stone composition is required [12]. In Sri Lanka, facilities are available only for qualitative analysis of stones. It does not give information about the proportion of different constituents, a key factor in recognising the type of stone.

The composition of stones varies in different countries. In Sri Lanka a widely held belief is that stones are more common in certain parts of the dry zone and this is attributed to hardness of water. There is no evidence of any rise in the risk of stone formation in relation to water hardness [3]. However, some studies suggest that a high intake of fluoride may behave as a mild promoter of urinary stone formation by excretion of insoluble calcium fluoride and increasing oxalate excretion [13]. The prevalence of urolithiasis is 4.6 times higher when the fluoride levels in drinking water rises from 3.5 to 4.9 ppm. Water in wells in the dry zone districts of Anuradhapura, Polonnaruwa and Ampara often contain a fluoride content greater than 3 ppm [14].

Non-pharmacological interventions reduce the 5-year rate of stone recurrence by up to 60% in people who stick to a "sensible" diet [15]. Patients should be encouraged to increase their fluid intake enough to produce a minimum daily urinary output of 2 litres, particularly during heavy exercise and fever, and when travelling long distances. A high intake of fluids has been shown to be effective even when used as the only method to prevent stone recurrence [16]. A low animal protein diet prevents the mild acidosis induced by animal protein breakdown and improves calcium homeostasis. Dietary sodium restriction (to about 100 mmol/day), oxalate restriction (avoidance of spinach, tea, nuts), increased citrus fruit intake (orange juice and home-made lemonade), decreased intake of refined sugars and optimising dietary calcium intake (up to an equivalent of one glass of milk daily or 800–1000 mg a day) are considered as useful dietary measures [17,18]. Dietary calcium restriction is harmful as it may even increase the risk of stone formation and can lead to bone demineralisation [19].

Depending on the results of the metabolic evaluation and stone analysis pharmacological intervention is recommended. Effective drugs are available for cystine, uric acid and infected stones and for several secondary causes of calcium nephrolithiasis. In idiopathic calcium nephrolithiasis thiazides, allopurinol and potassium citrate have been shown to be effective [10,15]. New evidence links the decolonisation of oxalate-degrading intestinal flora with a higher risk of calcium oxalate stone formation, possibly opening the door for biological manipulation as a novel approach for the prevention of urinary stone formation [10].

Metabolic risk factors in patients with renal stones vary in different population groups [20]. Extrapolation of findings from studies in other countries may not give a true picture about the situation in Sri Lanka [21]. It is important to collect epidemiological data about the main risk factors for stone formation, both individual and environmental.

Despite the rising costs of advanced medical technology, facilities for modern techniques of stone removal have been made available in both state and private hospitals in Sri Lanka [4, 22]. Yet some of the basic facilities required for comprehensive stone analysis and metabolic evaluation of stone formers are not available in the country. The approach to clinical medicine has evolved over the last 20 years to incorporate therapeutic strategies to prevent long term negative outcomes rather than to simply treat acute events. Urinary stone disease in Sri Lanka requires such an approach. Otherwise we cannot say anything better than Frere Jacques Beaulieu, a celebrated French lithotomist who said, 300 years ago, 'I have removed the stone, it is up to the God to cure the patient'.

References

1. Menon M, Parulkar BG, Drach GW. Urinary lithiasis: aetiology, diagnosis and medical management. In: Walsh PC, Retik AB, Vaughan ED, Wein AJ, eds. *Campbell's Urology*. 7th edn. London: W.B. Saunders, 1998: 2661–733.
2. Abeygunasekera AM, Nirupika H, Bulegoda H. An observational study of obstructive uropathy with renal impairment. *Sri Lanka Journal of Urology* 2001; **2**: 22–4.
3. Ramello A, Vitale C, Marangella M. Epidemiology of nephrolithiasis. *Journal of Nephrology* 2000; **13 (Suppl. 3):** 545–50.
4. Goonawardena SAS. Nephrolithiasis: metabolic evaluation of stone formers and preventive medical therapy. *Sri Lanka Journal of Urology* 2002; **3:** 1–5.
5. Auge BK, Preminger GM. Surgical management of urolithiasis. *Endocrinology and Metabolism Clinics of North America* 2002; **31:** 1065–82.
6. Jewett MA, Bombardier C, Menchions CW. Comparative costs of the various strategies of urinary stone disease management. *Urology*1995; **46:** 15–22.
7. Downey P, Tolley D. Contemporary management of renal calculus disease. *Journal of the Royal College of Surgeons of Edinburgh* 2002; **47:** 668–75.
8. Yu CC, Lee YH, Huang JK, Chen MT, Chen KK, et al. Long-term stone regrowth and recurrence rates after extracorporeal shock wave lithotripsy. *British Journal of Urology* 1993; **72:** 688–91.
9. Ansari MS, Gupta NP. Impact of socioeconomic status in aetiology and management of urinary stone. *Urology International* 2003; **70:** 255–61.
10. Delvecchio FC, Preminger GM. Medical management of stone disease. *Current Opinion in Urology* 2003; **13:** 229–33.
11. Saravanapavanathan T, Ganeshamoorthy J. Prophylactic aspects of urolithiasis. *Jaffna Medical Journal* 1987; **22:** 37–41.
12. Saravanapavanathan T, Mageswaran R. Nature and composition of urinary calculi:A preliminary study in northern Sri Lanka. *Jaffna Medical Journal* 1988; **23:** 37–42.
13. Singh PP, Barajatiya MK, Dhing S, Bhathagar R, Kothari S, et al. Evidence suggesting that high intake of fluoride provokes nephrolithiasis in tribal populations. *Urological Research* 2001; **29:** 238–44.
14. Dissanayaka CB. The fluoride problems in the ground water of Sri Lanka – environmental management and health. *International Journal of Environmental Studies* 1991; **38:** 137–56.
15. Bhil G, Meyers A. Recurrent renal stone disease-advances in pathogenesis and clinical management. *Lancet* 2001; **358:** 651–6.
16. Borghi L, Meschi T, Amato F, Briganti A, Novarini A, et al. Urinary volume, water and recurrences in idiopathic calcium nephrolithiasis: a 5-year randomised prospective study. *Journal of Urology* 1996; **155:** 839–43.
17. Seltzer M, Low RK, McDonald M, Sham GS, Stoller ML Dietary manipulation with lemonade to treat hypocitraturic calcium nephrolithiasis. *Journal of Urology* 1996; **156:** 907–9.
18. Wabner CL, Pak CY. Effect of orange juice consumption on urinary stone risk factors. *Journal of Urology* 1993; **149:** 1405–8.
19. Curhan GC, Willett WC, Rimm EB, Stamfer MJ. A prospective study of dietary calcium and other nutrients and the risk of symptomatic kidney stones. *New England Journal of Medicine* 1993; **328:** 833–8.
20. Goad EHA, Bereczky ZB. Metabolic risk factors in patients with renal stones in Kwazulu/Natal: An inter-racial study (Asians and Whites). *British Journal of Urology International* 2004; **93:** 120–3.
21. Abeygunasekera A, Nirupika H, Bulegoda H. An observational study of staghorn calculi in south Sri Lanka. *Ceylon Medical Journal* 2002; **47:** 115–6.
22. Perera ND, Nishanthi DPND. Uretero-renoscopy: early experience at a tertiary referral centre. *Sri Lanka Journal of Urology* 2003; **4:** 13–16.

AM Abeygunasekera, *Urological Surgeon, Teaching Hospital, Karapitiya, Sri Lanka. Tel: +94 11 2 763 427, e-mail:< amabey@sltnet.lk> (Competing interests: none declared).*