ORIGINAL PROF-855

URINARY CALCULI;
BIOCHEMICAL PROFILE OF STONES REMOVED FROM URINARY TRACT

DR. MUNAWAR FAROOQ
MBBS, MCPS, FCPS
Medical Officer
Sheikh Zayad Hospital
Rahim Yar Khan

Dr. Awais Hameede
MBBS, FCPS
Medical Officer
Sheikh Zayad Hospital
Rahim Yar Khan

DR. MUHAMMAD ANWAR CH
MBBS, MCPS, FCPS
Senior Consultant Surgeon
Sheikh Zayad Hospital
Rahim Yar Khan

Dr. Hafiz Mansoor-ul-Haq
MBBS, FCPS (PART-1)
Medical Officer
Sheikh Zayad Hospital
Rahim Yar Khan

DR. MUHAMMAD All BUKHARI
MBBS, FCPS
Chief Consultant Anaesthetist
Sheikh Zayad Hospital
Rahim Yar Khan

ABSTRACT ... szhlib@hotmail.com Objective: To describe frequency of urinary stones according to chemical composition in patients presenting. Study Design: Prospective & descriptive study Setting: Sh. Zayed Hospital, Rahim Yar Khan. Period: Dec 1998 to Dec 2000. Material & Method: Of 125 patients presenting with urinary Lithiasis. who were operated in surgical unit-l. Patients of any age and sex have been included in the study while any patient who did not undergo surgical intervention due to any reason was excluded from the study. Results: Chemical analysis showed that maximum number of specimen (38.4%) had mixed stones having calcium oxalate and urate as main constituents. The next in order of frequency were pure calcium oxalate stones 28%. In 16% of cases calcium oxalate was mixed with phosphate. Only 8 cases (6.4%) had pure uric acid stones. Conclusion: Calcium oxalate was most frequent salt found in urinary stones.

Key words: Urinary Lithiasis, Calcium oxalate, urate stones.

INTRODUCTION

Urinary calculi have inflicted mankind for centuries. Evidence of bladder stones has been focused in Egyptian mummies in the remains of two North American Indians. Oneofwhich lived round around 1500BC1.Since that time, the varying incidence of stone diseases in different populations and the difference in the distribution and chemical composition has perplexed many observers. Urinary tract stones are third most common affliction of urinary tract exceeded only by urinary tract infections and pathologic conditions of prostate. Many epidemiological variables can modify the urinary risks factors. These include age, sex, heredity, occupation, social class, geographical location, climate and diet. Diet including fluid intake is the only one factor that can be easily changed and that has a marked effect on all urinary risk factors2. Role of stone analysis in the management of patients with urinary lithiasis used to be controversial. Drach has cited that in 1955, Burkland and Rosenberg asked various urologists their opinion regarding the importance of stone analysis[3].

Most of the urologists were of the opinion that stone composition did not have any importance in the management of urinary lithiasis. Now a day, this point of view has been changed and Urologists now agree that the composition of urinary calculi may indicate metabolic disorders and is clinically very important. The composition of each urinary stone must be identified[4].

Common methods used for stone analysis are chemical, optical and radiographic crystallography. Each method has its proponents as well as opponents. Chemical methods being simple and having only 2% error in detection of composition of stones are best for practical use in the hospitals. Qualitative chemical analysis can be carried out using E Merck's Urinary Calculi Kit. A Little powdered stone material is acidified with hydrochloric acid. Aliquots of this acidified solution are submitted to the tests as described by Sutor[5].

Stones with different chemical compositions have different physical characteristics. Oxalate Calculi are irregular in shape and covered with sharp projections which tend to cause bleeding. The surface of calculus is discolored by the pigments of altered blood. Phosphate calculus (usually calcium phosphate, although some times combined with ammonium, magnesium phosphate) is dirty white. The stone tends to grow in infected, alkaline urine and may enlarge to fill all or most of pelvis and collecting system forming a stag horn calculus. Uric acid and urate calculi are hard, smooth and often multiple. These calculi vary from yellow to reddish brown and they sometimes have an attractive multiple faceted appearance. Pure uric acid stones are radiolucent and appear on an excretion urogram as filling defect. In practice most of uric acid stones contain some calcium so they cast a faint radiological shadow. Cystine stones are uncommon and are often multiple and may grow to form a cast of the renal pelvis and calyces.

They are pink or yellow when they are first removed but they change colour to greenish blue when exposed to air. Xanthin calculi are extremely rare. They are smooth and round, brick red in colour and show lamellation on cross section[6].

Chances of recurrence of urinary lithiasis are quite high. It has been estimated that the recurrence rate of renal calculi is 60% in 7-years[7] and 80% in 18.5 years[8]. Prophylaxis of recurrence is becoming increasingly important. Successful prophylaxis however depends on the knowledge of the chemical composition of the stone removed[9].

OBJECTIVE

To describe frequency of urinary stones according to their chemical composition in patients presenting

at Sh. Zayed Hospital, Rahim Yar Khan.

MATERIAL AND METHOD

This was a prospective descriptive study of the patients presenting with complaints of urinary lithiasis and operated for same complaints. Sampling technique was non probability purposive sampling. Total 125 patients presenting with complaints of urinary lithaisis during course of 2 years have been studied and operated in surgical unit-l of Sheikh Zayed Hospital, Rahim Yar Khan. Patients of any age and sex have been included in this study while any patient who did not undergo surgical intervention due to any reason was excluded from the study. Chemical analysis of urinary stones was done in each case using E Merck's Urinary Calculi Kit.

RESULTS

Chemical analysis of stones removed from 125 patients showed that calcium oxalate was most frequent salt found. In only 8 cases (6.4%) uric acid was more than 75% while in rest of 117 cases (93.6%) calcium oxalate made dominant portion of chemical composition. In 35 cases (28%) stones were of pure calcium oxalate and in 82 cases (65.6%) calcium oxalate was mixed with other salts like urate and phosphate.

Table-l. Frequency of stones according to their composition.

Chemical Composition	No. of Cases	%age
Calcium Oxalate & Urate	48	38.4
Calcium Oxalate	35	28
Mg-NH4-P04+ Calcium Oxalate	20	16
Calcium Oxalate & Phosphate	14	11.2
Urate	08	6.4
Total	125	100

DISCUSSION

The chemical analysis of urinary stones in our study showed that maximum number of specimen (38.4%) had mixed stones having calcium oxalate and urate as main constituents. The next in order of frequency were pure calcium oxalate stones 28%. Only 8 cases (6.4%) had pure uric acid stones in which uric acid content were more than 75%.

Zafar et al in their study in Multan region reported that the maximum number of urinary stones (166) revealed calcium oxalate and urate as their main constituent. The study also revealed that 23.17% of specimen consisted of calcium oxalate only. These results are similar to our study[10].

Jahangir in 1981 from Lahore demonstrated that 80% of the urinary stones were of mixed variety. Pure calcium oxalate stones were 17% of the total cases 11. Rab F et al from NWFP found 58% pure calcium oxalate stones in a study of 188 specimens of urinary calculi[12].

It is in contrast to our study where this figure was 28%. However they also observed that calcium oxalate was the main constituent in 94% of specimen which exactly correlate the figure in our study.

Dejane et al from Jordan reported very high percentage of calcium oxalate stone (75%)13. Kamble et al from sudden observed 50% calcium oxalate stanes in his study14. These observations are different from our study. Various studies from India as well as other Asian countries show high urate content in renal calculi. Singh et al from Delhi analyzed 243 renal stones and showed results in 38.25% of cases[15].

Rao et al from Gwaliar (India) found even higher proportion of urates, while calcium oxalate was seen in only 3.5 % of stones[16].

In the west, the chemical composition of the stones is different. Lonsadle in 1968 demonstrated that majority of the stones from USA and Czechoslovakia have high calcium oxalate and calcium magnesium phosphate contents[17]. Similar findings were reported by Prien and Prien form USA[18]. They Analyzed 1000 stones and demonstrated that the majority of the stones were composed of calcium oxalate and urate were found in traces.

In our study urate content in stones was in between the two above mentioned groups of study 6.4% of patients had pure uric acid stones while in 38.4% of patients urate were found in significant quantity along with calcium oxalate while calcium oxalate dominated the overall picture being a major constituent in 94% of cases and 28% of cases were of pure calcium oxalate.

As chemical analysis has shown dominance of calcium oxalate, to prevent recurrence of urinary lithaisis one should drink large amount of water and stop taking food

rich in oxalate. For example apple, cola, ice cream, orange, milk, spinach, tea and yogurt. It is advised to take a lot of lemon to reduce the amount of calcium in urine. Eating excessive sugar and animal proteins (meat, milk) can cause changes in the chemical compositions of the urine that may lead to formation of stones. Eating fiber (Natural food like whole meal bread), flakes, brown rice, spaghetti, lasagna, and plenty of fruits will increase the fiber intake and lower the risk of stone formation.

REFERENCES

1. Andriani R.T. and Caison C.C. Urolithiasis. Cilinical symposia, Ciba 1986; 38(3).

2. Kriger SN, Kronmal RA, Coxon V. Dietary and behavior risk factors for urolithiasis: Potential implication for prevention. Am. J Kidney Dis., 1996; 28: 195-201.

3. Drach G.W. Urinary lithiasis. ln,"Cambell's Urology" Walsh P.C., Gittes R.F., Peslimettes A.D., and stamery TA (eds) Philadelphia W.B. Saunders Company 1986; PP1094-1172.

4. Beukes G.J., De Bruiyn H. and Virmik W.J.H. Effect of changes in epidemiological factors on the composition and racial distribution of renal calculi. Br. J. Urology. 1987; 60:387-392.

5. Sutor D.J. The nature of urinary stones and their analysis. In," Renal tract stone, metabolic basis and clinical living practice." Whickhanus JEA and Buck A.C.(eds), Edinburgh, Churchill Livingstone 1990; PP36.

6. Christopher Fowler. The Kidneys and Ureters in R.C.G.Russel, N.S. Williams, C.G.K. Bulstrode (eds). Short Practice of Surgery. London. Arnold 2000; 1184.

7. Sprenak J.P. Rsnick Ml. Urinary Stones. In: Smiths General Urology. Tangho EA. Me Anniuch J.W. (eds), Connecticut, Prentice Hall International Inc. 1992; 271-298.

8. Williams RE. The Natural history of renal lithiasis. In," Renal Stone Research Symposium". Hodgkin son A. Nordin BEC. (eds), London: Churchill Livingstone 1969; 65-70.

9. Kupin WL. A Practical Approach to Nephrolithiasis.HospitPrac. 1995; 30: 57-60.

10. ZafarH.M. Prevalence of type of renal stone in Multan region. Pakistan Journal of

Medical Research 1992.31:13-17.

11. Jehangir M. Correlation of Chemical Composition of Urinary Stones. Dissertation (FCPS) Lahore. 1981; 107-116.

12. Rab F. Qazi F.M. Ahmad R., Zahoor Ullah Khan, I Akhtar T. A Study of urolithiasis in North west Frontier Province, Pakistan. Journal of Pakistan Medical Association. 1990; 40(10): 241-243.

13. Dayani AM; Bjornesjo KB. Urinary Stone Disease in Jordan. In Brocks JG. Funalison B.E.D. Urinay Calculus. Littlest on Massachusetts: P.G. Publishing Company. 1981; 35.

14. Kamble A., Wahab E.M.A. Khattab A.H.H. The Pattern of Urolithiasis in Sudan. Br. J. Urol. 1970;51: 342-344.

15. Singh S.M., Chally R and Subramanian K.A. Observation of the Chemical Analysis of 117 Urinary Calculi. Ind. J ,,- ., MED. Sci. 1969; 23: 607-609.

16. Rao B.B.N., Gupta H.N. and Rangenekar G.V. Chemical Composition of Urinary Calculi. J. Ind. Med. Ass. 1984; 43:469-471.

17. Lonsdale O.K. The Formation of Urinary Calculi. Br.J Hosp. Med. 1968; 243-246. ,:

18. Prien E.L. and Prien E.L. Composition and structure of urinary stones. Am J Med. 1968; 45: 465-672.