MANAGEMENT
OF
STONE KIDNEY

AN ESSAY
SUBMITTED IN PARTIAL
FULFILLMENT FOR THE
MASTER DEGREE IN
GENERAL SURGERY

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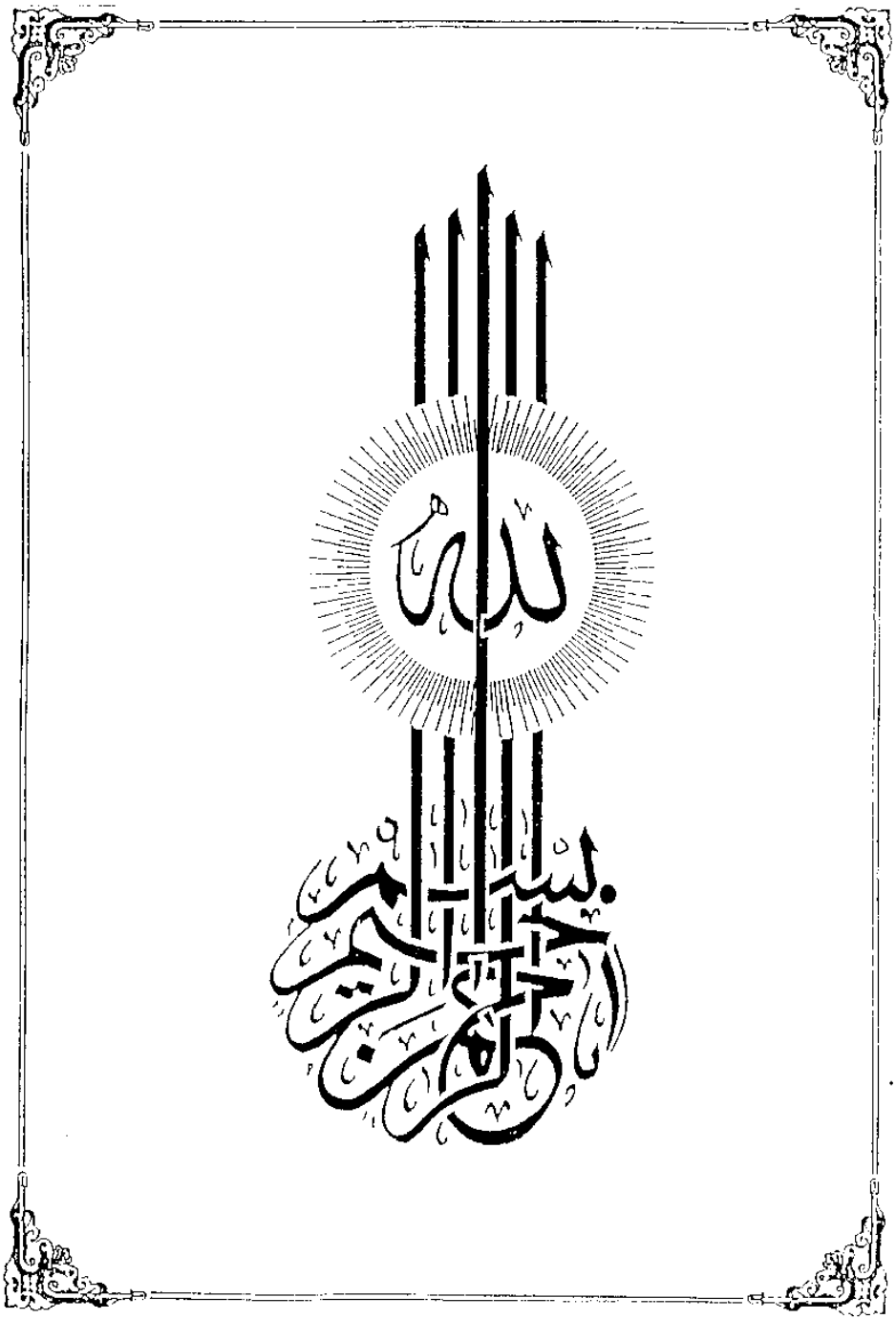
To my

parents.



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CHAPTER I

HISTORICAL REVIEW & GENERAL CONSIDERATION

(I) HISTORICAL REVIEW

History of urinary stone and lithotrite:

Nelse (1949), mentioned that the earliest specimen of a bladder stone is that discovered by Professor Elliot Smith in the grave of an Egyptian at El Amara. Elliot Smith considered the stone to be about 7000 years old. It was discovered in the pelvis of the skeleton of a boy of about 15 years of age. In India there is evidence that urinary stone was a prevalent disease as early as 2000 B. C. Somewhere about the beginning of the Christian era, there were "surgeons" in India who operated for urinary calculi. Hippocrates, the great Greak physician, wrote extensively about the various types of urinary calculi four centuries B.C.

From the days of Hippocrates, 400 years B.C., to the time of Cheselden in the early 18th century A.D., there were traveling lithotomists. These men received no formal training in the medical schools of the day. They were a group apart. They were either self-taught or they learned their "trade" from each other. They were very secretive

about their methods, and often handed these "secrets" down from father to son. They were, in fact, quacks, and existed only because the regularly trained physicians refused to enter the field of lithotomy. One of the reasons the regular physicians in that remote day took no interest in lithotomy, or in surgery in general, in fact was because of the severe penalties for failure to cure which were imposed upon them by those in authority. In the middle ages, an operating physician received no fee if his patient died. He would, quite likely, have to pay damages to the relatives of the deceased. If a physician operated upon a slave and the slave died, the physcian could be called upon to pay the owner the value of the slave.

There were apparently two reasons for the rise and continuance of the travelling lithotomists: because of the harsh and inhuman treatment given the physician in case of failure; and the fact that there were few large cities in those days, thus no lithotomist would have had enough "material" had he remained in one place.

Beginning with Celsus, who lived in the first century A.D., and Galen, who lived in the second century A.D., and continuing down to about 75 years ago, the only

"urologists" were those who specialized in cutting for stone.

HISTORY OF RENAL SURGERY:

Hippocrates, 400 years B.C., suggested that when there was a bulging in the loin in the area of the kidney, it should be incised. Probably a good many incisions for perinephric abscesses were done, but seldom was the kidney opened. Very few of the surgeons knew enough anatomy to open a kidney for stone. There was also the possibility of uncontrollable bleeding, a danger of which they were well aware.

Zambecarrius and Etienne Blancard, near the end of the 17th. century, performed some experiments in nephrectomy and suggested the possibility of removing a kidney for disease. It was, however, considered too dangerous a procedure and there is no record of their ever having done one.

Again, in 1757, Hevin restudied the problem and believed that it would be possible to remove a kidney in a living person. But again he too concluded that it was

fraught with too many dangers.

The first planned and deliberate nephrectomy was performed by Gustave Simon in 1869. Simon's patient, a woman, had a permanent urinary fistula following injury to the ureter in the course of a pelvic operation. Simon removed the kidney and the patient survived.

In 1872 Ingalls removed a large calculus by right lumbar operation. It was soon learned that incision of the renal parenchyma was accompanied by severe bleeding or followed by secondary haemorrhage. This lead Heinecke to employ pyelotomy incision in 1879. Guyon was among the first to perform nephrectomy for unilateral calculus disease.

From 1869 to about 1910, the mortality in kidney surgery fell from about 50% to about 20%. Since 1910, kidney surgery has been for the most part in the hands of the specialists, urologists, who have brought the average mortality in all types of kidney surgery to less than 5%.

(II) General Consideration

GEOGRAPHIC DISTRIBUTION

It has long been recognized that urinary calculi are observed in natives of some countries or localities more frequently than those of others. Investigations in relation to these "stone areas" have led to theories that diet, water, climatic conditions, or geologic formations may be the influencing factors. Most of the statistics on the geographic distribution of calculi refer to vesical stones; the data dealing with renal lithiasis are not so reliable.

Fujimaki (1918) called attention to the great prevalence of calculi in the population of southern China, and to their relative rarity in that of northern China. McCarrison (1921) noted the high frequency of calculi in the Punjab of northern India, and the much lower frequency in natives of southern India. Guerrini (1926) charted the existing stone areas in Turkey. Additional stone areas have been reported for Madagascar, for Egypt, and for the valley of the Volga in Russia.

Doty (1931) reported that in Great Britain the stone areas are along the east coast, in North Wales,

in parts of Derbyshine and westmoreland. He found that calculous disease was rare in Ireland and South America. The findings in Joly's extensive study indicated that lithiasis was more prevalent in the old world than in the new, and that the three important stone areas, India, Mesopotamia, and sourthern China are regions defective in sanitation and hygiene. He attributed the progressive decrease in the incidence of calculi among Europeans to improved hygiene and nutrition. Boyce and Strawcutter (1956) sent questionnaires to a large number of general hospitals in the united states to determine the number of patients admitted with calculi in the five years from 1948 to 1952. The greatest frequency of calculous disease was reported from the southeastern states, with the second highest frequency occuring in New England.

A survey of the so called "stone areas" yields no common denominator on which to base the cause of stone formation in natives of these regions; obviously, among the different groups displaying a high incidence of urinary lithiasis, considerable variation esixts with regard to factors such as diet, water supply, and climate. The evidence indicates that at present the incidence of vesical calculi is lower in some areas where it was unusually

high in the past. This is not true of renal calculi, in fact, there is an apparent increase in the incidence of renal and ureteral calculi in citizens of United States. This apparent increase may reflect more accurate present -day diagnosis.

General Considerations:

As a general rule, renal lithiasis is a disease that occurs predominantly in the third and fourth decades, though it occurs in patients of all ages.

The incidence is slightly more often in men than in women, the origin of a calculus may be in the pelvis or the calyx of a kidney. The minute calculi usually are observed first in the lower calyx of the kidney. They form at this site primarily or migrate to this dependent position.

Phosphatic calculi may enlarge rapidly; the growth of oxalate stones is slow. The growth of cystine and uric acid calculi is somewhat more rapid than that of oxalate group. The rate of growth of renal calculi is influenced by the rate of crystalloid excretion in the urine. In the absence of renal infection, aseptic stones

are often solitary and relatively small in caliber; if infection and stasis are present, the stones enlarge. Multiple stones often are found in the presence of stasis and infection.

Bilateral calculi are almost always observed in the presence of renal infection and, as a general rule, bilateral and multiple stones are found late in the course of the disease.

Reddy (1960) reported that the incidence of bilateral renal calculi had decreased slightly in the last 20 years; 9% of the patients with calculous disease admitted to the hospital had bilateral renal stones.

All the causes of renal stone formation are not known, but in most cases multiple factors are involved. An adequate stone analysis is the key to an understanding of the pathogenetic mechanisms involved. In the U.S.A., two thirds of the renal stones are composed of either calcium oxalate or mixture of calcium oxalate with calcium phosphate in the form of hydroxyapatite. Pure apatite or brushite (Calcium hydrogen phosphate dihydrate) stones are very rare (Smith 1975).

Magnesium ammonium phosphate accounts for 15% of all stones and occurs almost exclusively in patients with urinary tract infections with urea splitting organisms and persistently alkaline urine. Uric acid and cystine stones accounts for about 10%. Miscellaneous stones are composed of xanthine, silicates, or matrix and occasionally of artifacts brought in by patients as "kidney stones".

If a stone is not obstructive, it is not apt to cause injury or symptoms. If it blocks a urinary passage (e.g. the ureteropelvic junction), it leads to severe symptoms and renal damages. Since stones tend to recur, a patient with a non obstructive stone may later form a stone which will cause obstruction, for this reason, investigation of the cause of the first stone is of importance in the prevention of later renal injury (Smith 1975).

Chapter II

Anatomy of the Kidney

1- General anatomy

The kidneys are paired retroperitoneal organs lying in close proximity to the spinal column immediately below the thoracic diaphragm in the shallow troughlike renal nich. The upper poles of the kidneys more nearly approach one another so that the renal axis (a line extending the center of the upper and lower renal poles or radiologically a straight line drawn through the midportion of most inferior and superior caly x of the kidneys), when projected superiorly, intersects the thoracic spine. The renal axis is of extreme importance in urography, since any deflection of this axis suggests extrerenal pressure with displacement, i.e. adrenal tumours, duplicated kidney, retroperitoneal tumours, and so on.

2- Surface anatomy.

The kidneys lie between the twelth thoracic and second lumbar vertebrae and thus to a considerable extent within the thoracic cage. These organs occupy a more medial