CHEMICAL AND OPTICAL STUDY OF URINARY STONES IN EGYPT

THESIS

Submitted in Partial Fulfilment
for the Master Degree of
General Surgery

BY

NABIL FAHMY HABASHY
M.B., B. Ch.

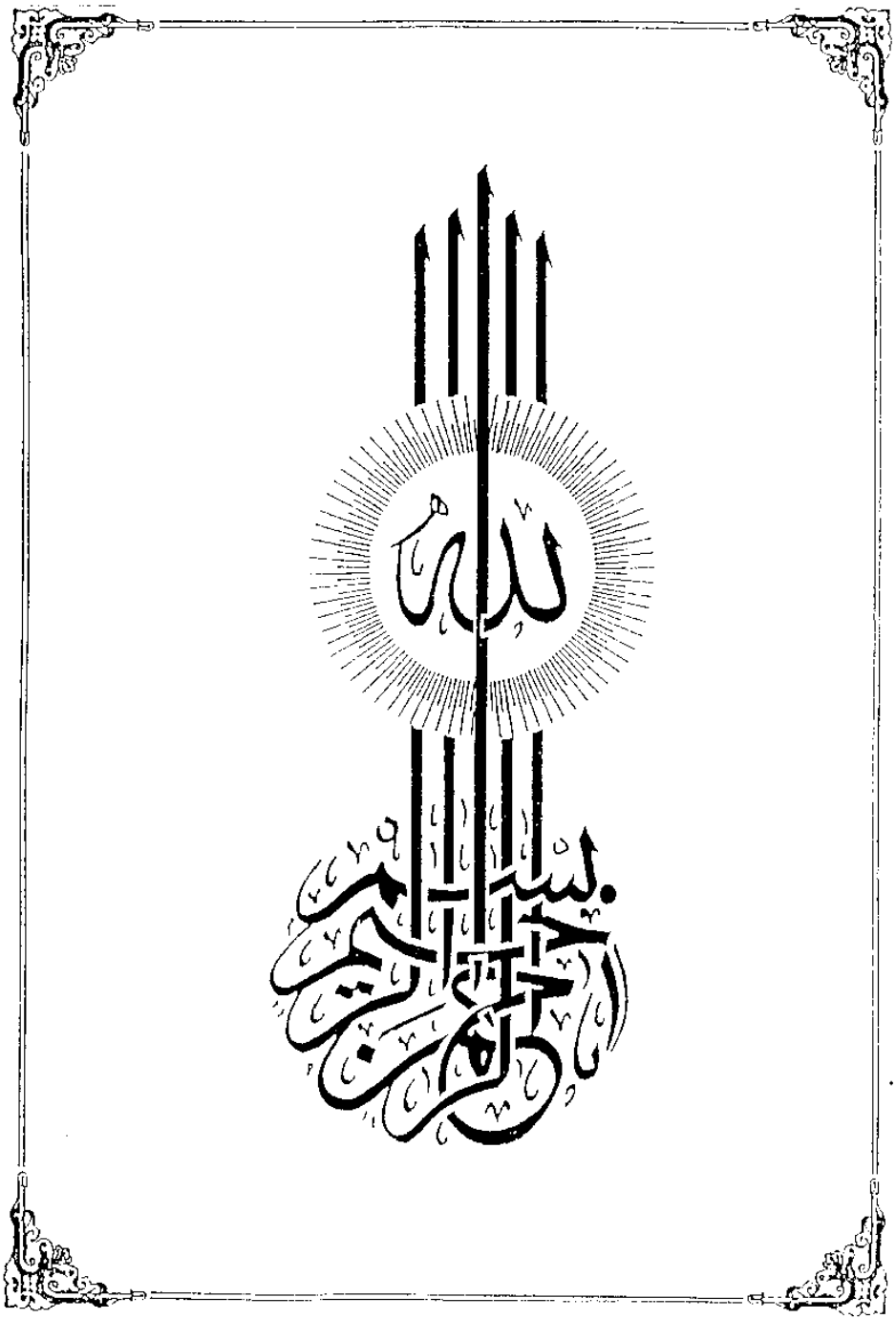
Supervised By
Professor Dr. ALY LASHEEN

Faculty of Medicine
AIN SHAMS UNIVERSITY
CAIRO

1984

TO

MY FATHER'S SPIRIT



ACKNOWLEDGEMENT

I am indebted to Dr. ALY LASHEEN Professor of Surgery, Ain Shams University who had supervised and followed the progress of this work.

I should particularly like to thank him for his initiation, suggestion, willing help and continuous encouragement .

I am greatly indebted to Dr. Ibrahim Abd el Nabi, Lecture of Surgery, Ain Shams University for his support and advice.

I wish also to extend my thanks to Dr. Maher Shaaban, Lecture of Geology Department, Faculty of Science, Ain Shams University for his help in carring out the optical study of this investigation.

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INTRODUCTION

INTRODUCTION

Man has undoubtedly afflicted with stone just as man is now. Riches (1969) refers to a stone that was found in the pelvis (presumably bladder) of an Egyptian skeleton estimated to be over 7000 years old. Perhaps because of the admonition of Hippocrates, surgical treatment of bladder calculi was for centuries traditionally left to numbers of wandering lithotomists. By the 17th and 18th centuries many of these men had become famous. Wangensteen et al. (1969) refer to some of the more famous lithotomists of that time. They included colot, Fr. Jaques, Rau, Fr. Cone, and others. Soon, however, surgeons trained in anatomy and other aspects of medical practice recognized that traveling lithotomists were not as adept at their calling as might be desired. Many of these well-trained individuals, whom Wangensteen et al. classified as " Professionals," began to take an interest in urinary lithiasis. Most of their interest centered upon improvement of techniques for removal of bladder calculi. As an example, Dupuytren, who is famous in many areas of medicine and surgery, developed a new type of

perineal instrument for removal of bladder calculi (Drach, 1974). Celsues, Franco, and Cheselden were other great contributors to the development of improved lithotomy techniques . Civiale and Bigelow, although separated in time by half a century, were instrumental in the development of practical lithotrity and litholopaxy techniques that are still used. Sir Henry Thompson became famous for his interest in medical therapy of bladder stone and suggested the possibility of treatment of bladder stone by dissolution (Thompson, 1873, cited by Thorwald). Only after this period of improvement in surgery did a significant amount of attention turn to medical treatment of urolithiasis, although naturopaths had tried unsuccessfully to treat " disease of the stone" for centuries. Galen, for example, treated stone disease with wine and honey, parsley and caraway seed; and Howship recommended administration of alkalis or acids to arrest calculi, as did Sir Asthey Copper (Cited by Wesson, 1935).

The history of stone disease implies that many diverse factors might be involved in its causation :

heredity, envirsonment, age, sex, urinary infection, the presence of metabolic diseases, and dietary excesses or deficiencies .

REVIEW OF LITERATURE

Epidemiologic Aspects of Urolithiasis

Andersen (1973) notes that the incidence of urinary calculi varies greatly with age, anatomic site and geographic distribution. He feels that there are at least two separate epidemiologic factors involved in the genesis of urinary calculi. The first of these may be considered intrinsic. Intrinsic factors are related to the inherited biochemical or anatomic makeup of the individual.

The second term is extrimsic factors or environmental factors. These include climate, water available for drinking, dietary patterns of populations and of households of people with urinary calculi, the presence or absence of trace elements in foodstuffs and drinking water, differing age and sex distributions of types of calculi, and different occupations.

I. Intrinsic Factors

1. Heredity :

Underlying all epidemiologic concepts of causation of urinary calculi is the role of heredity.Numerous

authors have noted that urinary calculi are relatively rare in the North American Indian, the Negros of Africa and America, and the native- borne Israeli . It would appear that resistance to urinary stone disease has been part of the natural selection of individuals for persistence of their race in areas that have relatively hot climates. Conversely, the incidence of stone disease is known to be highest in some of the colder temperate areas of the world populated primarily by Eurasians and Caucasions. Although the incidence of bladder stones seems to be related primarily to dietary habits and malnutrition in underdeveloped and primitive countries, dietary improvement over the years has probably resulted only in a change of the site of occurrence of urinary calculi from bladder to kidney (Sutor, 1972), In other worlds, the hereditary capability of forming stones persists while the anatomic site of formation has changed .

Interest in the familial incidence of urinary calculi in relation to heredity is not new. We find

evidence of studies of this nature by Gram (1932) and Goldstein(1951), and more recently, genetic studies have been performed by Resnick et al. (1968) and Mc Geown(1960). These authors conclude that urolithiasis requires a polygenic defect (more than one gene is involved). In addition, genetic predisposition to urinary lithiasis has partial penetrance, so that the severity of stone disease may differ from generation to generation even though the individual has the gene defects necessary for urinary lithiasis .

2. Age and Sex :

The peak age incidence of urinary calculi occurs in the third to fifth decades. About three males are afflicted for every female. These observation are generally confirmed by most individuals who have studied age and sex incidence of urinary calculi (Blacklook,1969; Fetter and Zimakind, 1961; Inada et al., 1958). Several authors have pointed out that the maximum incidence of urinary lithiasis appears to occur in the 30 to 50 year age group (Bailey et al. 1974, Burkland and Rosembery,1955;

Fetter and Zimskind, 1961, Frank et al., 1959; Prince and Scardino, 1960). But when does urolithiasis begin? The majority of patients report onset of disease in the second decade of life; with decreasing onset through the third, fourth and fifth decades. Blacklock (1969), in a long term study of individuals in the military services, found that the chance of having one or more recurrences of urinary calculous disease during a period of many years was 67 per cent for the male patient with idiopathic urinary lithiasis .

During childhood, males and females are apparently equal toward urinary lithiasis (Malek and Kelalis,1975; Prince and Scardino, 1960). This observation, coupled with reports that increased serum testosterone levels resulted in increased endogenous oxalate production by the liver (Lias and Richardson, 1972), leads Finlayson (1974) to postulate that lower serum testosterone levels may contribute to some of the protection women(and children) enjoy against oxalate stone disease. Recently, Welshman and Mc Geown (1975) have demonstrated increased

urinary citrate concentrations in the urine of females, and they postulate that this may aid in protecting females from calcuim urolithiasis .

II. Extrinsic Factors

1. Geography :

Given the fact that heredity, age, and sex must have important effects on the incidence of urinary lithiasis, numerous other studies also attempt to relate high or low incidence to the geographical distribution of this disease. There is an increase in urinary calculi in mountainous or tropical areas. Finlayson (1974) reviewed several recent world-wide geographic surveys and stated that the United States is relatively high in the incidence of urinary calculous disease for its population. Other high incidence areas are the British Isles, Scandinavia, the Mediterranean countries, northen India and Pakistan, northern Australia, Central Europe, Portions of the Malayan Peninisula, and China. In certain other areas of the world there is a relatively low