ROLE OF CONVENTIONAL RADIOLOGY AND RECENT MEDICAL IMAGING TECHNIQUES IN DIAGNOSIS OF ACUTE ABDOMINAL TRAUMA

THESIS

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BY

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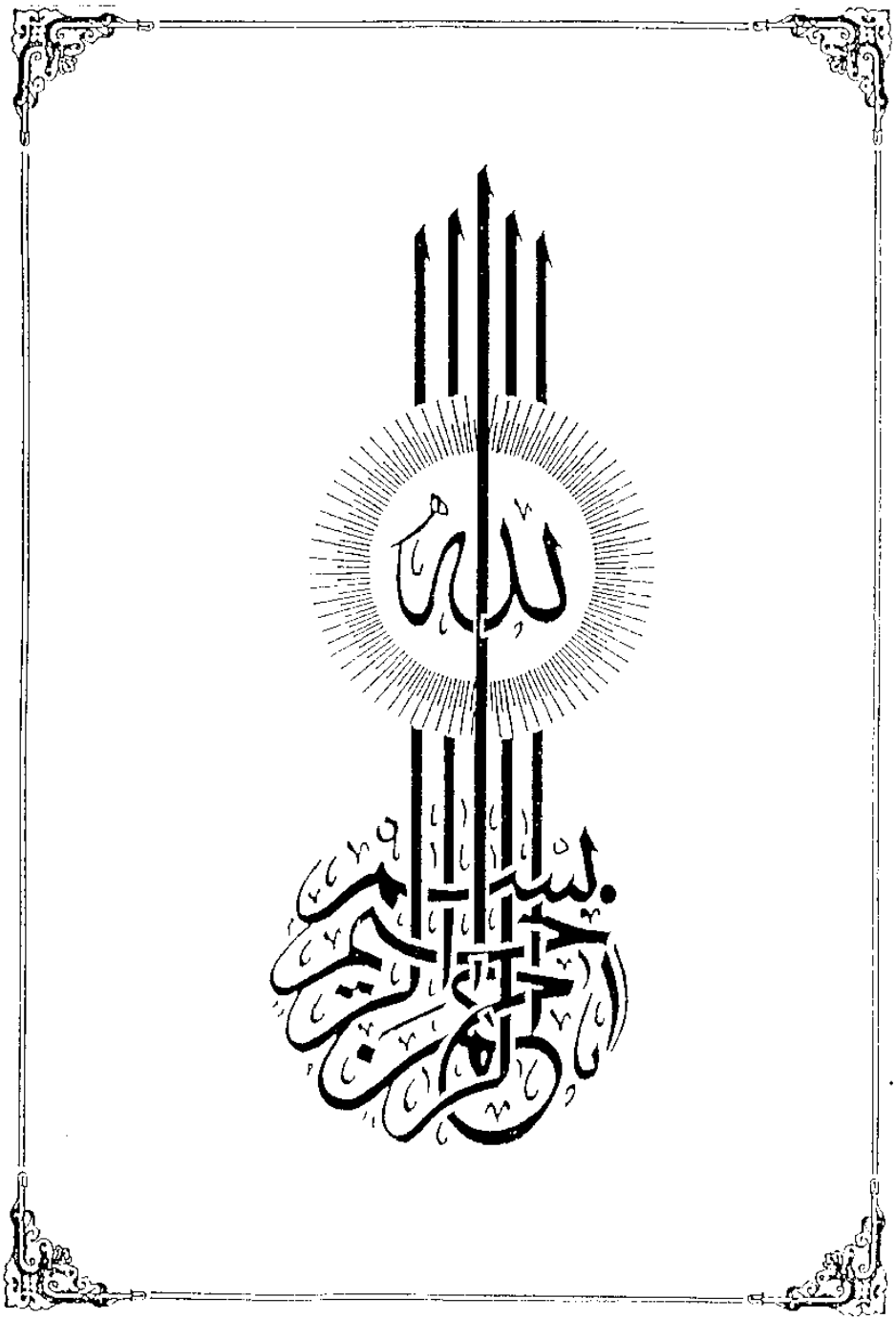

DEDICATION

THIS WORK IS DEDICATED TO

MY MOTHER
who brought me up,

MY BELOVED WIFE
who always paved my way
and made this work possible
with her encouragement and tolerance,

MY CHILDREN
Mazin, Mohammed, Khalid and Ossama
who are my hope of a brighter future,

THE SOLE OF MY FATHER
who was the victim
of a major trauma,

and to
All Victims of Trauma
and to the
Radiologists and Clinicians
who strive to help them.

CONTENTS

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Introduction and Aim of Work

INTRODUCTION AND AIM OF WORK

Abdominal trauma, whether accidental or due to an assault, has become an increasingly common problem in this era of increasing violence and machinery work. Large number of patients are admitted to the emergency rooms because of abdominal trauma of varying degree of severity. Fortunately, there is a growing awareness of the potential gravity of trauma on the quality of life in the society as it is realized that the majority of the trauma victims involved in road traffic accidents, falls, industrial accidents and penetrating wounds are young and in the midst of their productive lives. The impact of proper diagnosis and care on these lives is enormous and justifies the priority given to the care of these patients.

The trauma might be penetrating or blunt nonpenetrating injury. The victim of a gunshot or an eviscerating stab wound of the abdomen will attract the prompt attention of the hospital staff and usually undergoes urgent exploratory laparotomy. On the other hand, the blunt-trauma patient may be handled with less concern because the abdominal wall is intact, the symptoms and signs are vague, the initial vital signs may be satisfactory, and the severity of the injury is uncertain. Accordingly, the incidence of error in clinical diagnosis of blunt abdominal trauma injury is high.

Hence, our main emphasis in this study will be on blunt abdominal trauma since these types of injuries lend themselves more readily to radiological evaluation and at the same time present the most difficult diagnostic challenges. There is probably no other setting which tests so thoroughly the efficiency and efficacy of the radiological team as does the examination of the traumatized patient.

Over the past two decades, several new diagnostic imaging techniques have been developed and used to enhance the accuracy of diagnosis and treatment. These modalities include: ultrasound, computerized tomography (CT), digital subtraction angiography (DSA), radionuclide scanning, interventional radiology, and magnetic resonance imaging (MRI). As a consequence of the wide range of available imaging techniques and of their relative novelty, there has developed a need to evaluate and compare their usefulness in different clinical settings.

The aim of this work is to provide a comparative comprehensive study of the role of conventional radiology, and the recent imaging modalities, e.g. ultrasound, CT, etc., in the assessment of patients with acute abdominal trauma, in order to plan or suggest a schedule for their examination to obtain the proper diagnosis in the shortest possible time. Thus, giving the patient the maximum chance of having rapid adequate decision for his best line of management.

Review of Literature

REVIEW OF LITERATURE

In 1968, the "Conference on Trauma", sponsored by the National Institute of General Medical Sciences in the United States declared that trauma constituted a national epidemic and stated, " A particular urgent need is to identify and evaluate procedures to diagnose and clarify all factors involved in any injured person, and to improve the capability to forecast sequelae " (Rhoads et al, 1968).

Trauma remains a major public health problem allover the world. Blaisdell and Trunkey (1982), have noted that abdominal injuries account for approximately 10% of all fatalities due to trauma, and even a greater percentage of those sustaining significant disability. Blunt forces produce the majority of these injuries in adults according to Strauch (1973) and Ward (1981), and are responsible for over 90% of accidents involving paediatric patients as reported by Touloukian (1978).

The morbidity and mortality associated with blunt abdominal trauma result from well-defined threats to life: bleeding from disruption of solid organs or vascular structures and infection from perforation of a hollow viscus, (Committee on Trauma, American College of Surgeons,1982).

The frequency of injury of different abdominal organs in cases of abdominal trauma was reviewed by Blaisdell and Trunkey (1982). They collected the work of Anderson and

Ballinger (1975), Bolton et al (1973), Davis et al (1976), Griswald and Cellier (1961), Longmire and McArthur (1973), Lucas and Ledgerwood (1975), Trollope et al (1973), and Walt & Wilson (1975); and gave the frequency of visceral injuries in the following table.

VISCERA INJURED	FREQUENCY %
Spleen	25 %
Liver	15 %
Retroperitoneal Hematoma	13 %
Kidney	12 %
Small Bowel	9 %
Bladder	6 %
Mesentery	5 %
Large Bowel	4 %
Pancreas	3 %
Urethra	2 %
Diaphragm	2 %
Vascular	2 %
Stomach	1 %
Duodenum	1 %

Frequency of visceral injuries in blunt abdominal trauma. (From: Blaisdell and Trunkey, 1982)

In 1984, Schwartz reviewed other collected studies of different series of blunt abdominal trauma; shown in the following table.

VISCERA INJURED	FREQUENCY %
Spleen	26.2 %
Kidneys	24.2 %
Intestines	16.2 %
Liver	15.6 %
Abdominal Wall	3.6 %
Retroperitoneal Hematoma	2.7 %
Mesentery	2.5 %
Pancreas	1.4 %
Diaphragm	1.1 %

Frequency of injury in abdominal trauma (Schwartz, 1984)

AETIOLOGY AND PATHOGENESIS OF ABDOMINAL TRAUMA:-

The aetiology of injury of different abdominal organs was classified by Ahmed & Dana (1982) as follows:-

1. Direct (Accidental): Whether blunt or penetrating trauma might result from a road traffic accident (RTA), criminal assault, athletic injury or falling from a height. The injury might involve any abdominal organ whether solid organ, hollow viscus or vessel. Injury to the organs might be produced in RTA by direct impaction trauma in a pedestrian hit by a car, by seat belt trauma (compressing the abdominal organs) if not properly applied, or by impaction trauma in a car-to-car accident (Delany & Jason, 1981). The seat belt trauma might well cause small or large bowel rupture, retroperitoneal rupture duodenum, rupture diaphragm, mesenteric injury, or fractures (Williams & Kirkpatrick, 1971; Snyder, 1972; Federle & McCort, 1983).

2. Iatrogenic: Injury of an abdominal organ might occur during diagnostic or therapeutic interventional procedures whether radiological or non-radiological; e.g. spleenoportography, PTC, PTC with biliary drainage, ERCP, PERC, Endoscopy, true-cut biopsy, and other interventional procedures. The trauma may be in the form of injury to a solid organ or perforation of a hollow viscus (e.g. colon or bladder during endoscopy).