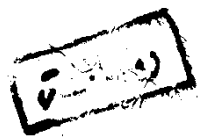
A STUDY ON THE EFFECT OF CLOSED SUCTION DRAINAGE ON ABDOMINAL WOUND INFECTION

Thesis submitted for partial fulfillment of the M.D. Degree

By

MAHDY M T BORGHOL, FRCS(Eng) FRCS(Glasg)



ABDOMINAL WOUND DRAINAGE

A LITERATURE REVIEW

AND STUDY OF PROPHYLACTIC SUCTION DRAINAGE

OF ABDOMINAL WOUNDS

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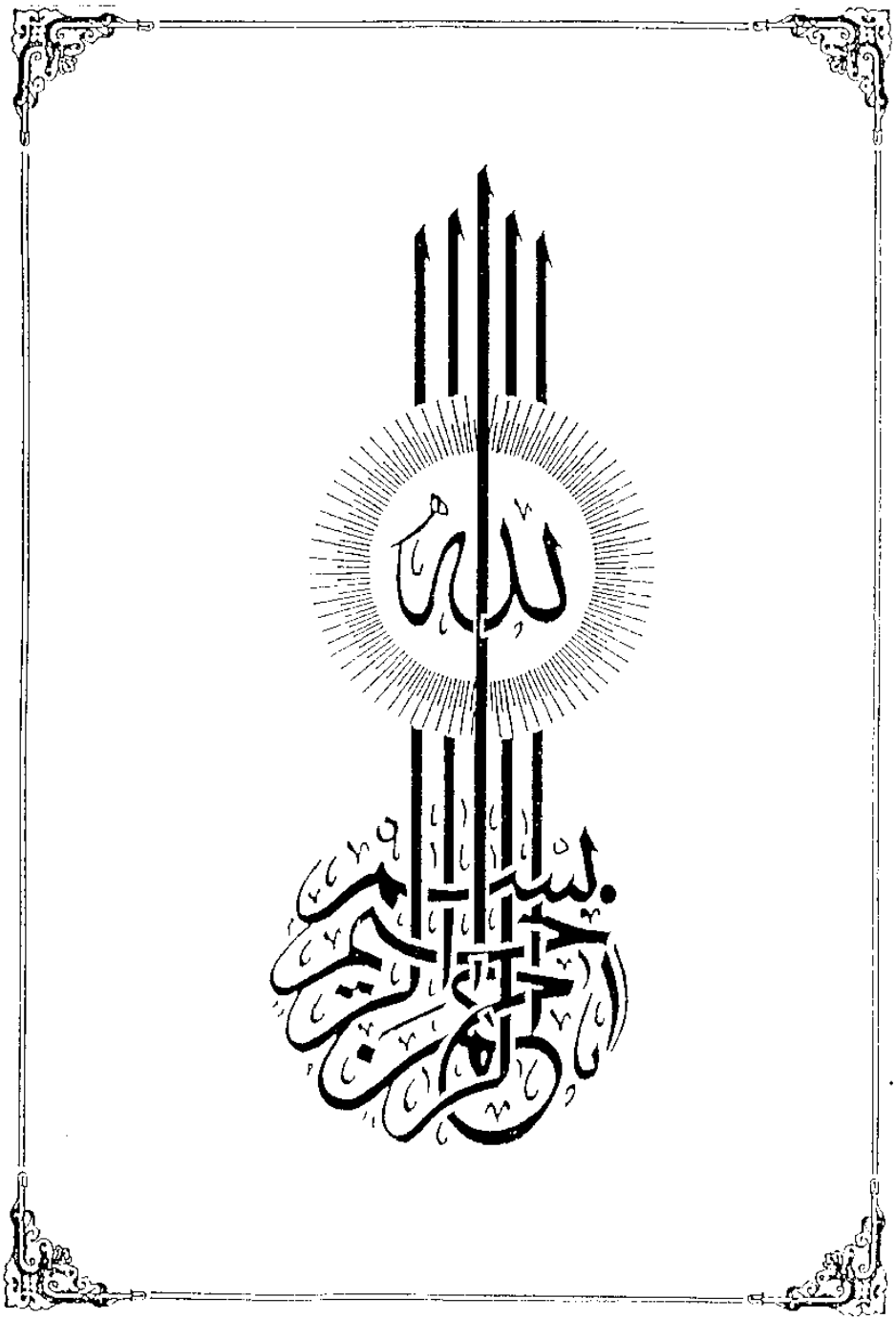

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ACKNOWLEDGEMENT

This work has been generously supported by many colleagues to whom I would like to express my appreciation and gratitude. The contributions made by my supervisors cannot be reimbursed with words of thanks. Professor Abdullah I El Fiky was extremely patient and provided much help despite his many heavy commitments. Without his support, this work could not have been accomplished. Mr John Holdsworth made a great effort in supervising the work and formulating the text. His finger prints are on every page if not in every sentence. Professor Adel Ain Shoka and Dr Rasha Khalil provided me with a lot of useful information and guidance as to how this work should be presented.

I would also like to specially thank the nursing staff on ward 7, Ashington Hospital headed by sisters Lynn McAloon and Margaret Little, who offered tremendous help and cooperation with the management of the patients pre and postoperatively. Mrs Sheila Pattison, control of infection sister at Ashington Hospital, contributed a great deal to this work. She undertook the painstaking task of inspecting all the wounds with a neutral view. In fact she deserves to be a partner in this study. Dr John Sellers, consultant microbiologist, together with his staff at Ashington Hospital Laboratory supplied us with the ground bacteriological data and saved no effort in advising and guiding us along. I am also grateful to Mr Alistair Beattie, statistician to the Northern Regional Health Authority, Newcastle upon Tyne for his help with the statistical review.

Lastly, my family; my wife and children suffered the most during prepartion of this study especilly in the final stages. Their cooperation and understanding was most appreciated. It is for them that this work is dedicated.

Mahdy Borghol

August 15th, 1989

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INTRODUCTION

The success of any form of surgical procedure is entirely dependent upon the tissues natural ability to heal. The art of employing this natural phenomenon to achieve wound healing is inherent to the profession of surgery. Our forefathers, lacking any appreciable knowledge of anatomy, physiology or pathology relied completely on this natural phenomenon to accomplish healing. However, despite many recent advances in this field, our knowledge of the details of this phenomenon remains limited, and today as more complicated surgical procedures are performed our need to rely on this natural ability has become even more demanding.

Healing of abdominal wounds is associated with a high incidence of complications, such as infection, dehiscence, incisional herniation and persistent sinuses, all of which carry significant morbidity and mortality. Infection on its own is the most important complication of abdominal wounds. This is because not only it has the most disturbing effects

on the healing process, but also is the most common one, constituting more than half of all abdominal wound complications. Moreover, infection is a significant predisposing factor in the development of other complications.

The difficulties encountered in the management of abdominal wounds are threefold. Healing of the musculo-aponeurotic layer is particularly slow, as it takes the wound more than 12 weeks to gain adequate tensile strength. The wound is contiually under stress as a result of the natural ambulatory and respiratory efforts. In addition, infection is a frequent complication because of contamination by the gastrointestinal tract and the perineum. Many other factors which influence wound healing in general, also affect abdominal wound healing. Understanding the relationship between these factors and the basic pathophysiology of the healing process aids in enhancing our knowledge of how to heal wounds and it is through manipulation of these factors that one can hope to maximize the healing process.

Accordingly, recent methods of wound management take

into consideration all the factors which could have an impact on wound healing. Wound infection prophylaxis exemplified in the various aseptic and antiseptic practices is the most important such consideration. Antibiotics are also a great asset to wound healing. However, their use should follow strict guidelines based on a clear understanding of their different role in treatment as opposed to prophylaxis against infection. Surgical technique is also of paramount importance. Not only does this include careful and gentle handling of tissues, but also it includes many technical details such as good haemostasis, adequate treatment of sepsis, careful construction of anastomoses and avoidance of excessive contamination of the wound during operations on the bowel. While most of these methods have been extensively investigated, and their benefit to wound healing proven, the role of prophylactic drainage in promoting healing of abdominal wounds remains unclear. Intraperitoneal drainage has been studied on several occasions and its value especially in relation to anastomotic healing and prevention of infection remains controversial. Drainage of the parietal layer of the abdominal wound, especially contaminated ones is usually believed to confer some benefit regarding prevention

of wound sepsis. However, some recent studies challenged this classic surgical teaching, and proved that open drainage in particular increases the likelihood of wound infection. On the other hand, although closed suction drainage proved its efficiency in promoting wound healing in certain situations e.g. mastectomy and orthopaedic and plastic procedures. its role in cleanly incised abdominal wounds has not been sufficiently evaluated.

In this thesis, the literature on wound healing is reviewed, starting with the history of wound management and wound drainage, followed by a discussion of the pathophysiology of wound healing and its relation to the clinical factors which influence this process. The practical applications of this relationship are also detailed. A clinical study of the effects of closed suction drainage on abdominal wound healing is presented. The results are discussed in the light of other studies conducted along similar lines and other methods of wound management.

PART A

LITERATURE REVIEW

HISTORY OF WOUND MANAGEMENT

Two major innovations in the history of medicine produced a radical change in the management of surgical wounds, the discovery of anaesthetics by Morton in the first half of the nineteenth century and the development of the antiseptic practices by James Lister in the second half of the same century. Anasthaesia allowed various surgical operations especially laparotomy to be peformed safely and successfully. Until that time, trauma was the main cause of wounds, while amputation and drainage of abscesses constituted the main causes of surgical wounds.

Prior to the introduction of Lister's antiseptic practices, wound management was based on no scientific principles. This situation is illustrated by the reply of Professor Ernst von Bergman in Berlin 1882 to a question by a surgeon from Riga, as to what was new in surgery. He said "today we wash our hands before surgery rather than afterwards"<1>. This indicates how long it had taken the

medical profession to realise this simple basic principle.

Until late in the middle ages (1100 - 1600 A.D.), the anatomy, physiology and aetiology of disease were based on Hippocratic and Galenic views, which considered that health and disease in man were due to the activity or interaction of four humours, which were named Melancholic, Sanguine, Choleric and Phlegmatic < 2 >. It followed that no acquired or extrinsic sources of disease were believed to exist and that the concept of preventive medicine was thus, never entertained. Another example of this unscientific thinking was the belief that maggots in decaying flesh develop by "spontaneous generation" < 2 >, even fairly large animals were believed to develop in this way. This hypothesis was very firmly held until it was finally disproved by the work of Louis Pasteur in 1860.

Micro-organisms were originally seen and described by Leeuwenhoek in 1674 < 1 >. Despite this, their incrimination into aetiology of infection was not appreciated, and when seen flourishing in substances undergoing putrefaction or fermentation, they were thought to result from the process of

decay, rather than being the cause of it. However, in the course of the development of scientific thinking, some intelligent guesses were made as to the causes of infection. Lucretius < 2 >, in 1100, suggested that infection was due to the "seeds" of disease being passed from the sick to the healthy. In a poem on syphilis, written in 1546, Fracostoro suggested that the disease was due to minute bodies or "contagion", which has the ability to multiply < 3 >.

Similarly, the importance of personal and communal hygiene and its relation to the aetioliogy of disease was not appreciated. In 300 B.C., Erasistratus of Alexandria complained in his writings that many physicians were not interested in hygiene < 2 >. As late as the mid-nineteenth century, the situation was almost the same. In 1880, Nussbaum, a German surgeon, wrote that he watched the Frenchman Nelaton washing his hands after cadaveric dissection, but not washing them further before starting a surgical procedure < 1 >. It is also reported that when Sir Astley Cooper was summoned to King George IV, he hurriedly responded, not caring to change his shirt which was stained with blood from his work in the dissection room < 1 >. This

shows that even social cleanliness was not appreciated as a distinct sign of appropriate professional appearance.

It is interesting however, to find that most prevalent religious teachings promoted a good standard of hygiene. For example, Islam taught that " cleanliness is a part of the faith " and insisted that prior to each of the five daily prayers a wash of the face, mouth, nose, arms and feet was required. Furthermore, a perineal wash was also required after each visit to the toilet. Today we know that potentially harmful organisms live on these parts of the body.

The only period, prior to modern times, in which there was a system of public hygiene was during the Roman civilization. Clean streets and water supply, and good drainage were characteristic, and this of course had an impact on the public health < 2 >. When this civilization declined, social and hygienic conditions in Europe underwent a severe deterioration.

Hospitals were equally unhygienic. J.Y.Simpson, a