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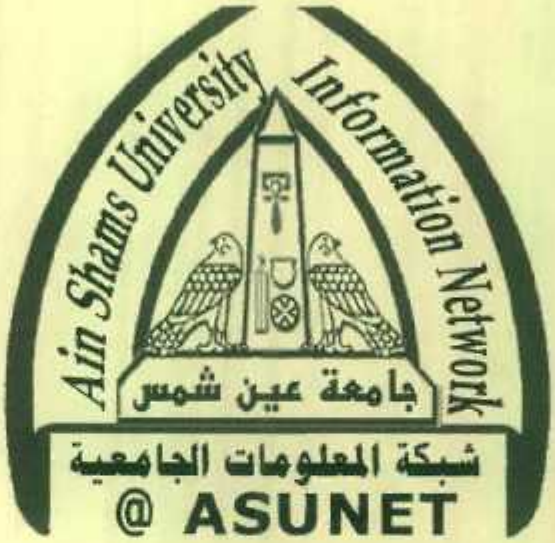

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THE ROLE OF AMNIOTIC MEMBRANE IN PREVENTION OF POSTOPERATIVE ADHESIONS IN RABBITS (EXPERIMENTAL STUDY)

Thesis
Submitted in Partial Fulfillment of Master Degree in Obstetrics and Gynecology

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INTRODUCTION

Postoperative adhesion formation is a common complication to all surgical subspecialities however, it has been evaluated most thoroughly after infertility surgery *(Clifford and Wheeless, 1992).* This analysis stems from the concern that adhesions limit postoperative pregnancy outcome *(Diamond et al., 1991).*

Operations on the female pelvic organs in contrast to bowel operations, presents a unique set of circumstances in regard to the formation of adhesions. There is less intrinsic motility in the female organs, and blood tends to pool in the pelvis, both of these circumstances tend to promote adhesions formation therefore, the prevention of postoperative adhesions is a pertinent topic for all gynecologists *(DiZerega, 1994).*

It has been recognized that pelvic adhesions occur in 55% to 95% of women following laparotomy *(Diamond, 1995).* This occurs despite the application of gynecological microsurgical techniques and despite the utilization of operative laparoscopy and medical and surgical adjuvants *(Steege, 1994).*

Three pathological processes are the major factors responsible for the development of adhesions; surgical trauma, pelvic inflammatory disease and endometriosis. However, the most common cause of peritoneal adhesion formation is previous surgical trauma *(Winston, 1987).*

The vast majority of post operative adhesions are harmless. However, pelvic adhesions may be the cause of bowel obstruction, pelvic pain and infertility ***(Coletti and Bossart, 1994).***

Peritoneal adhesions present one of the most common causes of infertility and represent a major factor in failed tubo-plasty and surgical restitution of fertility ***(DiZerega and Hodgen, 1990).***

Prevention of postoperative adhesions formation is a major problem in infertility surgery. The techniques the surgeons practiced to minimize peritoneal trauma remain the foundation of adhesion prevention. Tthese include; magnification, good exposure, gentle handling of tissues, meticulous hemostasis, the use of delicate instruments and fine sutures, careful dissection and complete excision of pathological tissues, reperitonealization without tension and avoidance of foreign bodies ***(Damario and Rock, 1995).***

Since the beginning of the 20th century, an enormous amount of work has been published by surgeons from allover the world who have attempted to prevent adhesions by all sorts of ingenious means ***(Ellis, 1971).*** The variety of substances which have been placed in the peritoneal cavity is quite astonishing and includes intra-abdominal administration of adrenaline solution ***(Marvel, 1907)*** oxygen ***(Bainbridge, 1909),*** olive oil ***(Claypool et al., 1910),*** omentum ***(Davis, 1917),*** 95% lanolin and 5% boric acid ***(Behan, 1920).*** Amniotic fluid ***(Johnson, 1927)***, amniotic membrane ***(Chao, 1940),*** Heparin ***(Lehman and Boys, 1940),*** omentum ***(McGehee and***

Trender, 1942), liquid paraffin ***(Norris and Davidson, 1943),*** chyle ***(Armbroster and Khawaja, 1962),*** saline, Ringer's Solution and Dextran ***(Gosz et al., 1966),*** synthetic materials includes surgical ***(Larsson et al., 1978),*** interceed ***(Linsky et al., 1987)*** and Goretex ***(Haney and Doty, 1992).***

Natural and synthetic barrier substances have been tried to further reduce adhesion formation by separating the traumatized surfaces from each other and thus preventing deposits of fibrin between organ surfaces. Natural materials include; peritoneum, omentum, fat, amnion or amnion plus chorion ***(Young et al., 1991).*** Synthetic materials include surgicel (Johnson and Johnson, New Brunswick, NJ), interceed (Johnson & Johnson Medical, New Brunswick, NJ) and seprafilm (Genzyme corporation, Cambridge, MA), but non has proved unequivocally effective ***(Arora et al., 1994; DiZerega, 1994).***

Swolin (1967), Winston (1975), Diamond (1977) and Gomel (1977) introduced microsurgery to gynecology and established its value as a therapeutic and research tool to treat and prevent pelvic adhesions.

Since 1980s, laparoscopy is replacing laparotomy being more safe, more convenient to the patient, save hospital beds and involves low morbidity. Moreover, the extent of adhesions was greater after laparotomy than laparoscopy. So, laparoscopic interference should

be the preferred surgical approach to the diagnosis and treatment of pelvic adhesions whenever possible ***(Avner et al., 1991)***.

The use of amniotic membrane as a surgical adjunct has a long history being cheap and available with controversial results ***(Tayyar et al., 1993)***. The natural membrane has been used in tubal surgery and in vaginal reconstructive surgery in women ***(Trelford and Trelford-Sauder, 1979)***, reconstruction of bile duct ***(Scudamore, 1988)*** and repair of conjunctival defects, corneal ulcers ***(Kim and Tseng, 1995)***. However, its primary application in humans has remained in the areas of burns, ulcers, skin trauma and in wound healing ***(Young et al., 1991)***.

This stimulated us to study the effects of amniotic membrane in prevention of postoperative adhesions in rabbit model.

AIM OF THE WORK

The present experimental study was carried out on rabbits to evaluate the efficacy of amniotic membrane grafting of raw peritoneal surfaces in the prevention of postoperative adhesions.

ANATOMY OF THE INTERNAL GENITALIA IN FEMALE RABBITS

The internal genitalia in female rabbit consist of 2 ovaries, 2 uterine oviduct, 2 uterine horns and a vagina. The reproductive tract is more or less Y-shaped, the cranial part of each wing of the Y forms a narrow uterine tube lying lateral to the ovary. The rest of each wing of the Y lies caudal to the ovary and forms much wider tube. The uterine horn, the uterine horn continues to form the body of uterus and it then narrows to form the lips of the cervix, the 2 uteri open separately into median tube which is the vagina ***(Kent, 1978).***

The ovary and the reproductive tract of the female rabbit are supported by a mesentery known as the broad ligaments attached to the uterine horns, is the mesometrium, that attached to the uterine tube is the mesosalpinx and that attached to the ovary is the mesovarium ***(Kent, 1978).***

Histology:

The mucosal lining of the oviduct consists of folded epithelium which has simple columnar epithelium; the mucosal layer is dominated by 2 cell types ciliated and non ciliated. They exert an important influence on the composition of oviductal secretion and on activities occurring within the lumen. The ciliated cells have motile cilia that created accurent combined by the peristaltic action of muscle propelling the ovum transfere into the uterine horn. The musculature of the oviduct consists of the inner circular and outer longitudinal layers.

The serous layer (serosa) is the outer layer of oviduct, composed of mesothelium and continues with that of peritoneum and connective tissue. The serosal layer is well vascularized ***(David and Gzernobilsky, 1968).***

THE PERITONEUM

A- Peritoneal structure:

The peritoneum consists of a single layer of flattened mesothelial cells which cover a layer of loose connective tissue. In most areas, the mesothelium forms a continuous surface. Adjacent mesothelial cells are joined by junctional complexes, which probably allow the passage of macrophages to and from the underlying connective tissue, in the same manner as endothelial cell junctions allow leukocytes to pass from the blood stream. In other areas, however, as in the greater omentum, the peritoneum may be discontinuous, presenting a series of fenestrations which may be visible to the unaided eye ***(Williams et al., 1980).*** Peritoneum is the largest serous membrane in the body the total area of peritoneum is approximately $1.8m^2$ which is almost equal to body surface area of skin. Peritoneum covers all of intestinal organs and the abdominal, diaphragm and pelvis ***(Wittmann et al., 1994).***

The sub-mesothelial connective tissue carries the cells usually found in loose connective tissues, but the population of macrophages, lymphocytes, and in some regions adipocytes, are particularly numerous. Aggregations of lymphocytes occur in some regions and form macroscopic "milky spots" under the mesothelium ***(Williams et al., 1980).***

The mesothelium is similar in many respects to the endothelial lining of blood vessels, in that it forms a dialyzing membrane across which fluids and small molecules of various solutes may pass ***(Williams et al., 1980).*** Transport is both effective and rapid, in human beings, 1 to