Different Modalities in Management of Anterior Abdominal Wall Defects

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INTRODUCTION

Anterior abdominal wall serves several functions; as it contains and protects the abdominal viscera, also it helps in pulling down on the ribs during forced expiration and coughing, defecation, micturation, child birth, fixation of the spine and assists in the rotation of the body ***(Roshini & Mark, 2006).***

The common clinical problems requiring abdominal wall reconstruction may be congenital defects as omphalocele or acquired defects as necrotizing fasciitis, tumor resection, trauma and ventral wall hernias or following dehiscence of laparotomy wounds. Ventral wall hernias and full thickness abdominal wall defects following resection of tumors account for 75% of complex abdominal wall defects ***(Loadsman, 2004).***

A complex abdominal wall defect is considered to be one of the factors that defy primary anatomical repair without tension which has been a challenge to reconstructive surgeons over years. This defect may be due to gross tissue loss, multiple previous procedures or distorted anatomy ***(Brig et al., 2007).***

Reconstruction plans for complex abdominal wall defects differ fom one case to another depending upon the clinical situation which includes the anatomical factors, site of the wound and wound bed quality, presence or absence of infection, presence of ostomies, location and size of defect and

whether the defect is superficial which involves only few layers of soft tissue of the abdominal wall or full thickness which involves all layers exposing the viscera ***(Cohen, 2006).***

Surgical approaches currently used vary greatly starting from open primary repair, skin or fascial grafts, open or laparoscopic allo-prosthetic mesh placement whether bio-prosthetic or synthetic, and local advancement or regional flaps including components separation technique, distant flaps, and combined flap and mesh techniques ***(Garrido et al., 2013)***, negative pressure assisted closure can also provide temporary coverage in abdominal wall defects when definitive reconstruction is delayed, tissue expansion also can provide superficial as well as full thickness coverage for defects upon the needs of the reconstruction plan and the suitability of the surrounding structures ***(Kilbride et al., 2006).***

All these methods aim at preservation of the functional and structural integrity of the abdominal wall, repair and prevention of abdominal wall herniation and achievement acceptable surface contour with minimal complications ***(James, 2006).***

Aim of the Work

The work aims to review the current approaches available for reconstruction of complex abdominal wall defects and discuss the alternatives in terms of patient and technique selection in an attempt to delineate treatment algorithms to maximize outcomes and minimize morbidity in such cases.

Chapter 1

ANATOMY OF ANTERIOR ABDOMINAL WALL

Knowledge of the anatomy of the anterior abdominal wall has helped the reconstructive surgeons to achieve one of the goals in managing abdominal wall defects and congenital abnormalities which is restoration of the structural and functional continuity of the musculo-fascial system ***(Grevious, 2007)***.

1. Embryology

The abdominal wall develop from the lateral plate of intraembryonic mesoderm of the paravertebral region as bilateral sheets that migrate anteriorly and envelop the future abdominal viscera. As differentiation proceeds, the intraembryonic mesoderm which at an early stage is composed of only a membrane of connective tissue that becomes segmented into proliferating bilateral sheets "somites" that migrate anteriorly and envelop the future abdominal viscera ***(Sadler, 1990)***.

Each formed of muscular buds from the dorsal myotomes which are segmentally connected to their corresponding neurovascular bundles. Along with the rectus muscles, the external and internal oblique muscles and transverse muscles

start to develop in the 6th to 7th week of gestation and their fascia encase the recuts abdominis muscles before these fuse in the midline. The leading edges of this sheet develop into the rectus abdominis muscles, which eventually meet in the midline anteriorly by the 12th week ***(Garrido et al., 2013).***

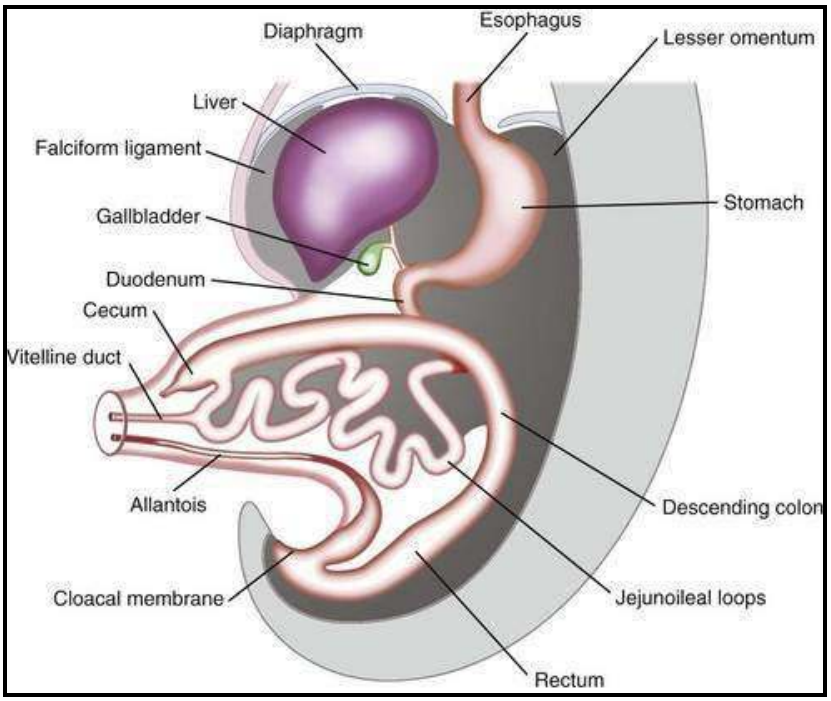

Figure (1): Embryo at 12 weeks at time of abdominal wall formation ***(Sadler, 1990)***

All of these segments coalesce in the midline at the umbilicus. Because the alimentary tract grows rapidly, at 6 to 8 weeks of gestation, all fetuses demonstrate a physiological herniation of the midgut by the 11^{th} week, the midgut rotates and return back into abdominal wall cavity with the alimentary tract in continuity ***(Sadler, 1990).***

Large gap was described in the skeletal system between the lower edge of the thorax and the upper edge of the pelvis. This gap is closed by muscles and their aponeurosis. It provides attachment points for the soft tissue and muscles of the abdominal wall ***(Sadler, 1990).***

2. Clinical Anatomy

Layers of the anterior abdominal wall include skin, subcutaneous tissue, superficial fascia, deep fascia, muscle, extraperitoneal fascia, and peritoneum ***(Rosen, 2012).***

Skin is thin and relatively mobile over the underlying layers except at the umbilical region.

Natural elastic traction lines of the skin (Kraissl's Lines) of anterior abdominal wall are disposed transversely, above the level of the umbilicus these lines run horizontally while it runs with an inferiomedial obliquity below the umbilical level.

Incisions made along, these lines help to heal without scarring, whereas incisions that cut across these lines result in a wide or ugly scars ***(Rosen, 2012).***

The ***superficial fascia*** of the abdominal wall consists of a single layer above the umbilicus, consisting of the fused Camper and Scarpa fasciae. Below the umbilicus the superficial fascia consists of a fatty outer layer (Camper fascia) and a membranous inner layer (Scarpa fascia).