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Prosthesis for hernioplasty in veterinary science

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Abstract

The use of prosthesis has become essential for the repair of almost all hernias in large animals because the recurrence rate is quite high due to many reasons. For this purpose a variety of newer prosthesis have been used. An ideal prosthesis should be strong, pliable, non-allergenic, inert, non-biodegradable, non-carcinogenic and should stimulate adequate fibroblastic activity for optimum incorporation into the tissues. Surgeons should be familiar to different types of prosthetic materials so as to select an appropriate one for a given case. Non-absorbable or composite mesh is recommended for hernial repair and its contact with the bowel should be avoided. This article highlights the merits and demerits of various types of prosthesis which can be used for different types of hernioplasty.

Keywords: Hernioplasty, glass fiber, mesh, prosthesis

Introduction

Hernia is defined as the protrusion of the contents of a body cavity through a normal or abnormal opening in the wall of that cavity either to lie beneath the intact skin or to occupy another cavity in its wall (Chandrapuria and Rai, 2013) [1]. The pathology of muscular wall from where the hernial content bulges are traditionally repaired by approximating the edges of healthy muscular tissue together and referred as herniorrhaphy. In certain instances where the hernia ring is not able to approximate is repaired by using a prosthetic material known as hernioplasty. It is essentially indicated in recurrent cases, weak and thin muscles, large hernia ring, devitalized hernia ring tissue and places subjected to high stress and weight especially in large animals (Chandrapuria *et al.*, 2013) [2].

Abdominal wall hernias may be repaired either by closing the defect under tension with sutures or by reinforcement of the defect with a prosthetic mesh. Suture techniques, either for primary repair or applied after failure of a primary repair, are characterized by high recurrence rate. Thus use of mesh has become essential in the repair of hernia. Recurrence rate is reported to be a prosthetic consistently lower when a prosthetic mesh is used and a variety of meshes with different special features have been developed for the hernioplasty (Bendavid, 1994) [3].

Physiological reconstruction

Surgical mesh implant is used to provide biomechanical strength to the attenuated structures. Surgical mesh is designed to withstand the tension forces acting on the abdominal wall. Further, the mesh must not impede and ideally should facilitate the healing process. The advantage that large pore size mesh offers over traditional small-pore mesh is that the tissue is able to grow through the large pores of the mesh and create a thinner, more integrated scar instead of the thicker, less flexible scar that is created with mesh of minimal pore size. Ultimately, this creates a more elastic scar and surrounding tissue for the patient (Holste, 2005) [4]. This new type of mesh commonly known as lightweight construction or reduced-mass mesh offers a combination of thinner filament size, larger pore size and a percentage of absorbable materials and has the capability of being more closely aligned with the physiologic properties of the abdominal wall.

The peritoneum is unique in its healing characteristics. The parietal peritoneum is comprised of a single layer of mesothelial cells covering a continuous basement membrane. This overlies loose connective tissue consisting of fibroblasts, collagen fibers, adipocytes, leukocytes, lymphatics and microvasculature. The visceral peritoneum's basement membrane overlies the extracellular matrix of the specific organ. Healing and regeneration of injured peritoneal mesothelium is unlike that of any other epithelial-like surface. The peritoneal healing differs from that of skin, because it heals gradually by epithelialization from the border.

Defects in the parietal peritoneum, in contrast, heal by simultaneous epithelialization of the entire surface. Hence complete mesothelialization, developing from multiple points throughout the defect, occurs just as rapidly for large and small defects (Divilio, 2005) [5].

Prosthesis selection and hernioplasty

An appropriate prosthesis should be selected and implanted for proper hernioplasty. The different suture materials Catgut, Vicryl, Silk, Umbilical and Satin tape suture can be used for herniorrhaphy. While for hernioplasty Mosquito net, Conventional polypropylene mesh, Prolene mesh, Stainless steel mesh and Glass fiber mesh may be used as per the requirement (Chandrapuria *et al.*, 2013, Rai and Chandrapuria, 2014) [2, 6].

Next important matter to consider is the size of the mesh. It is better to initially measure the size of the defect and then select a mesh of appropriate size. It should be wide enough to cover the defect in all directions since a smaller size may lead to protrusion of the mesh into the defect and result in a recurrence. Another important view is sterilization of selected material or mesh which can be significantly done by double autoclave (Chandrapuria and Rai, 2013, Rai and Chandrapuria, 2014) [1, 6].

Mesh should be appropriately fixed either with sutures or staples. If the mesh is not fixed, it may migrate and cause a recurrence. For intra-abdominal placement of the mesh, a few strong sutures should be placed at least at four corners of the mesh. Tissue adhesives like fibrin sealants and cyanoacrylates may be used to fix the mesh. These are minimal if prosthesis's are properly selected and fixed however sometimes some complications like seroma formation may be noticed. It is often a normal occurrence and resolves over a period. In rare cases, aspiration may be done using sterile technique in the operation theater.

Conclusion

The use of prostheses has become essential for repair of all hernias since the recurrence rates are lower when they are used and to fulfill this requirement, a variety of novel meshes have been engineered. Surgeons should acquire adequate knowledge of all different types of prostheses in order to select an appropriate one for a given case. Prosthesis with either an absorbable or a nonabsorbable barrier should be used for intra-abdominal placement to prevent bowel adhesions, since it is increasingly difficult to defend the use of a biomaterial that has no adhesion barrier in direct contact with the abdominal viscera. Selection of an optimum size and its proper fixation are mandatory. Complications may be avoided or minimized with proper selection of cases and performance of a meticulous technique. A case of bilateral abdominal hernioplasty with fiberglass mesh has been described, treated successfully.

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