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Hernia

Experts point of view

Ubiquitous use of prosthetic mesh in inguinal hernia repair: the dilemma

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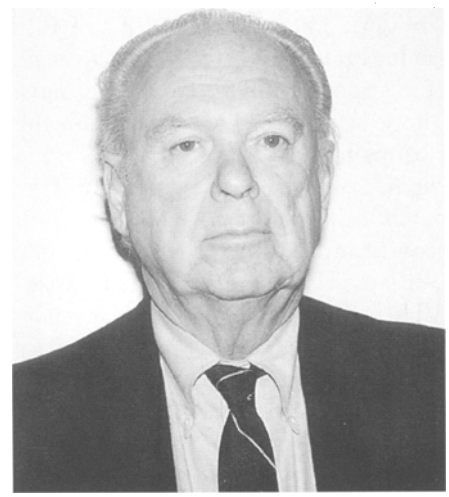

Summary: The omnipresence of prosthetic materials (mesh) used in hernia repairs throughout the world deserves careful review. The propensity to develop operative techniques wherein prosthetic mesh is used routinely, regardless of type hernia, has reached an unacceptable level of practice. Being foreign bodies, postoperative complications occur which directly can be traced to the implanted meshes. Recent interest in mesh complications, i.e., infection, mesh shrinkage, migration and fistula formation, has escalated. Although mesh foreign body tumorigenesis has not been seen in humans following hernia repair, there is sufficient animal data to cause concern. Similarly, neural complications following use of mesh, particularly after the open anterior no-tension repair methods, are being reported at alarming rates. Many types of inguinal hernias do not need mesh repairs. It is our premise that these hernias must be identified preoperatively. Certainly, type I, II and III C inguinal hernias of our classification, should not receive a prosthetic mesh repair. If prosthetic mesh is to be used, it should be placed to buttress the inguinal wall posteriorly so that advantage of Pascal's law may be assured.

Key words: Hernia – Prosthetic mesh – Foreign body tumorigenesis – Prolonged postoperative wound pain

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Herniologists are well aware of the search for suitable materials to re-enforce repairs performed upon defects in the abdominal wall. Historical aspects of this search have been well covered [Amid 1997, Read 1999]. This presentation is concerned with the current move to the universal use of prosthetic meshes, regardless of the hernial problem extant. The focus of these comments will be toward repair of groin hernias. Ventral abdominal wall hernias are repaired with use of prosthetic mesh, but world-wide experience in this setting is insufficient to make meaningful comments at this time.

The foreign body factor

My mind-set relative to the use of various meshes in hernia repair was that each formed a mechanical protective buttress against intraabdominal pressure. We have known that in addition, there is a greater or lessor inflammatory foreign body reaction with incorporation of the mesh into the surrounding tissues adding to the "holding" strength of the buttress. Fortunately, these reactions to the mesh have not led to rejection and extrusion of the foreign materials. Schumpelick and colleagues [Schumpelick 2001] have studied the

cellular, microscopic and gross aspects of sundry mesh types and list major areas of concern, including infection, mesh shrinkage, mesh migration and fistula formation; an impressive gathering of disconcerting data. The same Aachen group have reviewed as well the subject of foreign body tumorigenesis. Although to date, use of these materials in hernia repairs has not shown implantation tumor in the human, there is considerable data available in animals to warrant constant vigilance [Brand et al 1976]. On the basis of extensive laboratory studies, Brand and his colleagues made several cogent statements, e.g., "1. A more cautious and restrictive approach to artificial implantations..., 2. Smallest possible size of implants, and 3. Continued research on implant materials regarding suitability for specific surgical purposes" In subsequent years, there have been sufficient reports of sarcomas of varying histologic types associated with use of foreign materials in humans for us to invoke the above truisms of Brand. After review of 3 patients with angiosarcoma associated with a foreign body, Jennings [Jennings et al 1988] found in the medical literature 46 patients with sarcomas of varying histologic types. There was a latency period from 4 months to 63 years in development of sarcomas associated with these foreign materials. Of particular importance to our thesis is the Jennings group belief that "implanted foreign material should be considered capable of inducing virtually any form of sarcoma in humans."

Neural complications and mesh

In the era of open hernia repair, i.e., Bassini, McVay, Shouldice and ad infinitum, a rare postoperative pain or paresthesia would appear in the inguinal region, scrotum or proximal medial thigh [Starling 1995]. A tentative diagnosis of neuroma was made; neuroma following operative injury to one of the superficial inguinal region nerves. The diagnosis was relatively easy to ascertain and a series of therapeutic maneuvers were instituted with generally good results.

Current reports of inguinal region postoperative discomfort and or neuralgia following classic non-mesh anterior open hernia repair have not increased. However, I have the perception that persistent groin pain, or at least groin discomfort has been noted more frequently since the increased use of prosthetic mesh during so-called open "tension-free" hernia repairs. There is more to this than my personal view. In a large multi-hospital study from the United Kingdom, O'Dwyer and colleagues [O'Dwyer 1999] summarized their concerns as follows, "the patient's reports of pain in the groin at one year highlights such pain as the main complication after open tension-free hernia repair and warrants further research." Similarly, the plug anterior open hernia repair is not immune to long-term postoperative wound pain. Pelissier and colleagues [Pelissier 1999] reported an incidence of 8.6 per cent secondary pain in the groin at late evaluation following 202 plug procedures; of especial interest was a short lightning pain which occurred occasionally without relation to effort or movement. Certainly, this particular symptom has the connotation of being from neural origin.

We all have seen the build-up of scar (always considered advantageous in the healing process of weakened collagen deficient tissue) following the use of various prosthetic meshes. This result of the foreign body inflammatory response to the implanted mesh in anterior open operations must endanger adjacent peripheral nerves in the area, i.e., ilioinguinal, iliohypogastric and genitofemoral, setting the stage for prolonged groin discomfort if not debilitating pain. As surgeon-anatomists we should not be surprised at the potential risk of foreign body reaction to these nerves found in the bed of the tension-free mesh hernia repairs.

The use of prosthetic mesh-posterior operative approaches

In the early use of various laparoscopic techniques, lower abdominal wall nerves were at risk because of the misuse of stapling devices to fix the mesh buttress. Fortunately, the learning curve escalated positively so that neural disaster was in large measure prevented. Similarly, the GPRVS operation of Stoppa [Stoppa 1995] and our own posterior mesh placement [Nyhus 1989] have not suffered from neural complications since propinquity of peripheral nerves under discussion is absent. The latter two approaches are considered open methods, but both visualize the posterior inguinal wall and profit from the pressure effect to the mesh of Pascal's law, as do the closed laparoscopic hernia approaches and mesh repairs.

The dilemma

It seems that both the tension-free open hernia repairs and the posterior wall placement of prosthetic mesh have improved the recurrent hernia rate; reports are regularly in the range of 1-2 per cent following repair of primary groin hernias. Yet, can we continue to espouse the use of prosthetic mesh universally (ubiquitously) for all hernias. The answer is unequivocally no! The use of prosthetic mesh is unnecessary (probably contraindicated) in the small indirect inguinal hernias of our classification, Types I and II [Nyhus 1993]. In addition, we have demonstrated that the use of mesh for repair of the Type IIIC femoral hernias is not necessary [Nyhus and Patino 1999]. The Type IIIA, direct and Type IIIB large indirect, and Type IV recurrent groin hernias seem worth the risk of potential complications because of the aforementioned low hernia recurrent rate, particularly if the mesh is placed posteriorly, either by open or closed operations.

In the meantime, we must continue to search for improved prosthetic materials wherein the foreign body response is blunted, yet the curative effect is maintained.

References

Amid PK (1997) Classification of biomaterials and their related complications in abdominal wall hernia surgery. Hernia 1: 15-21

Brand KG, Johnson KH, Buoen LC (1976) Foreign body tumorigenesis. CRC Crit Rev Toxicol 4: 353-394

Jennings TA, Peterson L, Axiotis CA, Friedlaender GE, Cooke RA, Rosai J (1988) Angiosarcoma associated with foreign body material: A report of three cases. Cancer 62: 2436-2444

Nyhus LM (1989) The recurrent groin hernia: Therapeutic solutions. World J Surg 13: 541-544

Nyhus LM (1993) Individualization of hernia repair: A new era. Surgery 114: 1-2

Nyhus LM, Patino J (1999) Non-mesh repair of femoral hernia. Operative techniques in general surgery 1: 132-141

O'Dwyer PF, et al. (MRC laparoscopic groin hernia group) (1999) Laparoscopic versus open repair of groin hernia: A randomized comparison. Lancet 354: 185-190

Pelissier EP, Blum D, Damas JM Marre P (1999) The plug method in inguinal hernia: A prospective evaluation. Hernia 4: 201-204

Read RC (1999) Francis C. Usher, herniologist of the twentieth century. Hernia 3: 167-171

Schumpelick V, Klinge U, Klosterhalfen B (2001) Biomaterials for the repair of abdominal wall hernia: Structural and compositat considerations. *In* Nyhus and Condon: Hernia 5th Ed editors: R Fitzgibbons and G Greenburg. Philadelphia, Lippincott Williams and Wilkins. In Press

Starling JR (1995) Genitofemoral neuralgia. *In* Hernia (4th ed). LM Nyhus and RE Condon. Philadelphia, JB Lippincott

Stoppa RE (1995) The preperitoneal approach and prosthetic repair of groin hernias. *In* Hernia (4th ed). LM Nyhus and RE Condon. Philadelphia, JB Lippincott