ADHESION FORMATION TO INCISIONAL ABDOMINAL WOUND IN RESPONSE 10 POLYAMIDE

Pages with reference to book, From 184 To 185

Abdul Ghaffar Ansari (Postgraduate Medical Institute, Lahore.)

ABSTRACT

Frequency of adhesion formation to laparotomy wound scar in response to absorbable and non-absorbable synthetic sutures and closure technique was studied. Polyglactin “910” (synthetic absorbable) and polyamide "6" (synthetic non-absorbable) sutures were compared employing both mass and layered closure technique. Layered closure with polyglactin ‘910” closure developed maximum number of adhesions to laparotomy scar (JPMA 42:184, 1992).

INTRODUCTION

Sutures support the wound during the initial phases of healing when the incision has very little intrinsic strength. As the tensile strength of wound increases the need for the presence of sutures becomes less important. A strong, easy to handle synthetic absorbable suture polyglactin “910” fulfils the above criteria but to assess the tissue reaction, Polyglactin “910” suture was compared with non-absorbable synthetic monofflament nylon (polyamide “6”) suture by evaluating the adhesion formation to the laparotomy scar in rabbits at the period of 10th, 30th and 90th postoperative day.

MATERIAL AND METHODS

Forty eight mature rabbits weighing 1.25 to 1.5 kg were used in this study. Injection cephalexin intra muscularly was given in the morning before operation. Animals were anaesthetised by open ether. Skin of the ventral aspect of the abdomen was shaved and scrubbed with pyodine and spirit Abdomen was opened by 10 cm long right paramedian incision (muscle splitting).

Closure plan

The animals were randomly divided into four groups, each group consisting of 12 animals. The type of closure and suture material allocated to these groups was as follows:

Group I - Mass closure with polyamide “6”
Group II- Layered closure with polyamind “6”
Group III - Mass closure with polyglactin “910”
Group IV - Layered closure with polyglactin “910”

Skin stitches for all the wounds were applied with 2/0 silk.

Mass closure technique used in the study consisted of picking all the layers of abdominal wall apart from the skin and subcutaneous fat. Far-near mass closure technique was used. Layered closure consisted of first layer of continuous sutures approximating the cut edges of the peritoneum and posterior rectus sheath and second layer of interrupted sutures approximating the cut edges of anterior rectus sheath. Post-operatively two doses of injection cephalexin were given at 6 hours interval. Regular dressings were done and after removing the skin stitches on 8th post-operative day the dressing were discarded.

Animal sacrifice plan

All animals were divided into three sets A, B and C. Each set had 16 animals containing four animals from each group of the closure plan. Animals in set A were sacrificed on 10th post-operative day.

Whole abdominal wall was incised by rectangular incision and lifted up to see any adhesipns to operative site. Likewise animals in set B and C were sacrificed on 30th and 90th post- operative day respectively.

RESULTS

At the 10th post-oeprative day it was observed that the sutures were intact, knots were not loose. No wound showed adhesions. Microscopic examination of the tissue showed two patterns. The polyglactin "910" (absorbable suture) sutured wounds showed more exaggerated inflammatory response, giant cells and macrophages were seen indicating chronic inflammatory reaction while polyamide "6" (non-absorbable suture) sutured wounds showed less severe inflammatory response; no macrophages and giant cells were seen. At the 30th post-operative day it was observed that polyglactin "910" sutures had lost about 50% cross sectional diameter while polyamind "6" suture was encased in a fibrous coat. The observations about the cross sectional diameter of suture were based on naked eye examination by comparing it with unused suture. Internal aspect of the scar was examined and it was observed that out of four wounds closed by layered closure technique with polyglactin "910", three showed adhesions with omentum. No other wound showed adhesions. At the 90th post-operative they it was observed that the polyglactin "910" suture was completely absorbed with no signs of residual suture while polyamide "6" suture was coated by a fibrous capsule. Two wounds showed adhesions; one was closed by mass closure with polyglactin "910" while other was closed by layered closure with polyglactin "910" and in this case adhesions were with omentum and small intestine (Table).

TABLE. Sutures and frequency of adhesions.

Closure technique	Suture	No. of animals sacrificed	No. of animals showing adhesions
10th post-operative day			
Mass	Polyamide "6"	4	0
Layered	Polyamide "6"	4	0
Mass	Polyglactin "910"	4	0
Layered	Polyglactin "910"	4	0
30th post-operative day			
Mass	Polyamide "6"	4	0
Layered	Polyamide "6"	4	0
Mass	Polyglactin "910"	4	0
Layered	Polyglactin "910"	4	3
90th post-operative day			
Mass	Polyamide "6"	4	0
Layered	Polyamide "6"	4	0
Mass	Polyglactin "910"	4	1
Layered	Polyglactin "910"	4	1

DISCUSSION

The traditional method of closure of abdominal wound in layers is now being replaced by the mass closure technique because of the well proved fact that it gives more strength to the wound and less chances of wound dehiscence[1-3]. There is also 16% incidence of fibrous adhesions to laparotomy scar closed by two layers of continuous suture which is independent of peritonitis and wound infection[1,4]. This study on rabbits showed 16.6% incidence of adhesions in laparotomy scar in layered closure while only 4% in mass closure. With the advent of wide range of synthetic absorbable and non- absorbable sutures, it is important for the surgeon to take into account the progressive 'loss of suture thtough absorption and also reaction of tissue with the inserted suture. Polyglactin "910" suture (absorbable) is strong and absorption starts late. It is easy to handle and has good knot security while polyamide "6" (non-absorbable) has poor handling characteristics and poor knot security. In this study these two sutures are compared in respect to tissue reaction and adhesion formation as there are perplexing views about this problem. Some believe that non- absorbable sutures are more prone to adhesion formation[5] while others believe the opposite. Levy et al[7]., while detecting adhesion formation to uterine horn in response to new absorbable surgical clip and nylon sutures found more incidence of adhesion with absorbable surgical clip and detected that in many instances omentum was involved in adhesion formation. Tyrell et al[8] repaired abdominal wall defects in rabbits with two synthetics absorbable (polyglactin and polyglycolic acid) meshes and two synthetic non-absorbable (polypropylone and polytetra fluoro ethylene) meshes and found 10-20% incidence of adhesion formation with absorbable meshes and only 0-5% with non-absorbable meshes. The present study showed a higher frequency of adhesion formation with layered closure because in this technique there may be more strangulating effect on the tissues, but a higher incidence in the polyglactin "910" closed wounds (18%) certainly indicates that it is not only the tissue ischaemia which is responsible for adhesions but also the tissue reaction to sutures; as absorbable polyglactin "910" showed more intense tissue reaction when compared to polyamide "6" and was also responsible for more adhesion formation.

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