

Meat Eaters and Catgut Suture ‘Rejection’

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Abstract

Although catgut sutures have been used in surgery for many decades, we recently observed that catgut sutures were extruded at times from the wounds, more often in patients who were non-vegetarians when compared to vegetarians. Vicryl or prolene sutures were not extruded in non-vegetarians. This retrospective study consolidated the viewpoint that the extrusion may be a ‘rejection’ phenomenon in persons who were sensitized to sheep protein i.e., mutton eaters. Therefore these subjects could not tolerate catgut sutures, which is prepared from sheep intestinal mucosa. The phenomenon of catgut suture extrusion was observed in patients for whom this material was used in the subcutaneous plane.

Introduction

The interfacing of living tissue with a biomedical material elicits cell-material interactions that determine whether the implant will be tolerated or rejected. Sutures and wound dressings are implants in soft tissues, which act as scaffolds and ties for tissue growth and repair. Therefore they must be prepared from materials that do not produce any undesirable inflammation or clinically significant changes in the tissues or fluids of the body.^{1,2}

Control over the host responses at the biomedical material-tissue interface is a paramount problem because several physical, biological, clinical and technological factors are involved.³⁻⁶ In terms of tissue response, it was demonstrated that monofilament sutures have a smooth surface that prevents harbouring of microorganisms and thereby decrease the risk of inflammation. On the other hand braided and uncoated sutures have

a rough surface and a tendency to harbour microorganisms that can provoke an inflammatory response.

Among synthetic non-absorbable sutures polypropylene sutures (prolene) possess high tensile strength and resistance to infections. But its unique smoothness leads to low knot security, which is a limitation. Among the natural and absorbable sutures currently in use, catgut sutures which are basically collagen in nature have the highest tensile strength. In the old days, strings of instruments of the violin, fiddle, harp etc were traditionally made out of a stuff called catgut, which is a strange name since it was really made from sheep intestine. Sutures made from sheep intestine but peculiarly called, as ‘catgut’ have been one of the popular suture materials for a long time. However the word catgut is acutally a misnomer. The Arabic word ‘Kit’ means a dancing master’s fiddle, but the word catgut has no relation to a cat!⁷

Among synthetic absorbable sutures, vicryl a copolymer of lactide-glycolic acid, polydioxanone (synthetic sutures among PDS) and polymethylene carbonate (Maxon) are widely used. It is reported that original uncoated braided sutures from vicryl and

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Dexon (a homopolymer of glycolic acid) had rough surfaces and tendency to provoke inflammation and infection.⁸ To overcome this problem coated sutures like chromic catgut and dexon plus, with better tie down characteristics have replaced uncoated sutures. Moreover plain catgut has a life of only 3 to 7 days. If treated or coated with chromic salts to form the chromic catgut, it has an increased life up to 20-40 days. Chromic salts enhance the cross linking of collagen and thereby prevent its rapid degradation. Thus chromic catgut derived from sheep intestinal submucosa combines desirable aspects like natural origin, smooth surface due to coating or chromicisation, good tensile strength and absorbability. Since catgut is a resorbable suture, the material decomposes in the tissue interfaces and may be replaced by regenerating tissues, which again augments its biological acceptance.

But inspite of these favourable aspects of catgut, our experience showed that plain and chromic catgut caused inflammation and ultimately were 'rejected' in a sizable number of patients who received these sutures. It was interesting to note that all the patients who extruded the catgut sutures were non-vegetarians. This observations of extrusion of catgut during the wound healing process by some individuals who were non-vegetarians gave the idea that the extrusion may be a 'rejection' phenomenon in people who were sensitized to mutton. Therefore a retrospective study was made to consolidate this thought process.

Material And Methods

This is a retrospective study, which consisted of a total of 21 patients between the age group of 10 years to 50 years. These patients were included from our operative records of 2006-2007. These patients underwent abdominal surgery for reasons like appendicectomy, hernia, hysterectomy etc. Those cases with wound infections, prior surgery and possibility of spillage were excluded from the study. Totally there were 21 patients among whom 9 males and 12 females were present. Vicryl or prolene or catgut was used as subcutaneous suture material in these patients. All sutures were procured from ETHICON division of Johnson and Johnson Ltd. These patients were divided into 3 groups. Group I consisted of 2 patients in whom prolene was used as suture material. Group II had 7 patients in whom vicryl was used as suture material. Group III had 12 patients who received catgut as sutures. Each of these groups contained vegetarians and non vegetarians.

Results

Out of the 7 patients in whom vicryl was used as suture material, 6 were non-vegetarians and one of them was vegetarian. Wounds healed well in about one week post surgery in both non-vegetarians as well as in the vegetarian who received vicryl sutures. No adverse reaction such as serosanguinous discharge, pus or infection was observed at the wound site in any of them. In 2 patients where prolene was used as suture material

Table 1 : Tissue response to suture materials

Suture Material	Total No of patients	Tolerated		Rejected		Statistical significance
		Veg	Non-veg	Veg	Non-veg	
Prolene group I	2	1	1	0	0	I vs II 1.000
Vicryl group II	7	1	6	0	0	II vs III 0.010
Catgut group III	12	2	3	0	7	III vs I 0.363

it was observed that wounds healed well by the fourth to seventh post operative day without any adverse reaction at the site of the wound. Out of the 2 patients, one was vegetarian and another was non-vegetarian. But out of 12 patients in whom catgut was used as suture material, 5 patients tolerated the sutures very well and their wounds were healthy and healed within 1 week. Among these 5 patients, 2 were vegetarians and 3 were non vegetarians. Although non vegetarians these 3 patients consumed little or no mutton in their diet. One patient had never taken mutton but has the habit of eating only fish and chicken. The other 2 patients said that they very rarely consumed mutton. They consumed chicken and beef predominantly among non vegetarian food. Among the other 7 patients in group III adverse reactions at the wound site like pain, oozing, serosanguinous discharge and infection were seen along with ultimate rejection of catgut sutures. Among these 7 patients, in whom rejection of catgut suture was seen 6 had chromic catgut and 1 had plain catgut as suture material. In all of them, oozing followed by blood stained serous discharge from wound site was noticed between seventh and tenth postoperative day. Most of them complained of pain at the site of wound. Interestingly all these seven patients were non-vegetarians. Another feature common to all these non vegetarians was that they were all mutton eaters who consumed mainly mutton than any other non vegetarian items.

In one patient with chromic catgut the discharge from the wound and pus formation lasted up to 33 days and the catgut material was eventually extruded on the 45th postoperative day. Thereafter the wound healed well. In another female patient, pus and blood tinged discharge was seen on 7th postoperative day and pus was drained from

wound site on 8th postoperative day. Although the wound was healthy without signs of infection around 12th to 14th postoperative day, the patient passed the catgut stitch per vagina on the 22nd postoperative day, which also was infected. The catgut material was found to be culture positive for staphylococcus epidermis and klebsiella.

Another patient with chromic catgut suture showed serosanguinous discharge from 8th postoperative day onwards at wound site. On the 42nd postoperative day, purulent pus was aspirated from the wound and found to be positive for staphylococcus epidermis. Wound discharge lasted from 16th postoperative day to 40 post operative day in yet another patient with chromic catgut. Histopathological examination of sections of the catgut suture material revealed fibrous tissue formation along with neutrophil and lymphocyte infiltration in to the sutures. In the patient who received plain catgut suture, small blood droplets were noticed at the edge of the operated site on 23rd postoperative day. The catgut was rejected on 25th postoperative day following which it was removed.

The results obtained were analysed by Fisher's exact test. The results were not statistically significant when group I was compared with group II and group I was compared with group III. When group II was compared with group III the results were found to be statistically significant at the level of $P < 0.05$.

Discussion

The response of the tissues to an implant like a suture material may be only slightly different from normal postoperative healing if the material is chemically and physically inert.⁹ On the other hand healing is delayed if the material is less inert or highly 'irritant.' Foreign body giant cells are produced along with eventual scar or fibrous layer

formation.¹⁰ While the reactive fibrous capsule has such a physical basis, cellular response at the tissue-suture interface might also have a chemical basis in that it may be mediated or modified by proteins that are absorbed on the suture surface.^{11,12} Such a reaction might have taken place on the catgut suture surface.

It is documented that T cells are largely responsible for the rejection of tissue transplants or implants. T cells enlist the aid of macrophages in destroying foreign cells and stimulate B cells to increase the production of antibodies by cell cooperation. This will lead to the rejection of the implant if it is not prepared from carefully selected polymers and conditions that are biocompatible. But biocompatibility of plain and chromic catgut are well established and in concordance they did not provoke any adverse reactions leading to rejection in vegetarians. However adverse reactions, and extrusion of plain and chromic catgut sutures were observed in 'mutton eaters' only. This could be possibly explained as follows. Mutton or sheep meat could contain certain proteins that elicit an immune response in people who consume them. In these people, the body could have produced certain antibodies in response to the mutton protein antigens. The specific memory B cells and T cells remain in their body for a long time. It is known that specific memory B cells and T cells are long lived lymphocytes primed by their first contact with antigens. On renewed contact with the same antigen, these memory T cells and B cells are capable of producing a secondary immune response, a response that is more rapid, vigorous, with higher and longer antibody titre.

In the same way, mutton eaters might have contained memory B cells and memory T cells which were primed by their previous

contact with some antigenic protein present in mutton and remained latent in their systems. However when a plain or chromic catgut suture which is sheep intestinal mucosa is implanted in their body, the second contact with the material having the same antigenic proteins could have elicited a vigorous and prolonged secondary immune response leading to inflammation and rejection of the suture material.

Conclusion

Thus a secondary immune response mediated by memory T cells and B cells which is based on immunological memory may have initiated the events leading to severe inflammation and ultimate rejection of the catgut in mutton eaters. This phenomenon was not observed in vegetarians who did not have any memory cells primed by mutton protein antigens.

Acknowledgements

The authors wish to thank Mr. R Karunanithi for his assistance in statistical analysis and Ms. S Gowri for her help in the study.

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PREDICTING OUTCOME IN GUILLAIN-BARRÈ SYNDROME

'A simple scoring system for patients with GBS, based on three clinical characteristics, accurately predicts outcome at 6 months'

Despite advances in the treatment of Guillain Barre syndrome (GBS), clinical course and prognosis of this post-infectious peripheral neuropathy are highly variable. In the July issue of The Lancet Neurology Rinske van Koningsveld and colleagues report an association of clinical age, preceding diarrhoea, and disability score in the acute phase of GBS with the inability to walk independently at 6 months. On the basis of these findings, van Koningsveld and colleagues propose a system for predicting outcome that could help physicians to inform patients about their prognosis, identify high-risk groups, and guide future treatment trials. In Reflection and Reaction. Akiyuki Hiraga and Satoshi Kuwabara discuss how this model might be extended, and speculate that the scoring system might apply not only to demyelinating GBS but also to axonal GBS, a form of the syndrome that is particularly common in east Asia.

Lancet Neurol, 2007; 6 : 572, 589.