

A Prospective Comparative Study of Single-layered versus Double-layered Intestinal Anastomosis

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Abstract:

Aim: To analyse the perforators around umbilicus in a normal population group. To assess the clinical versatility of paraumbilical perforator based abdominal flaps.

Materials and Methods: Doppler analysis of site of paraumbilical perforators was done in 50 individuals of varying age groups, with normal abdominal wall. 32 patients having upper limb defects were reconstructed with paraumbilical perforator based abdominal flaps, in the Department of Burns, Plastic and Reconstructive Surgery, Kilpauk Medical College, Chennai, during the period of two years 2016 and 2017, and analysed.

Discussion: The perforators in paraumbilical region, were Dopplered in normal individuals. The paraumbilical region was divided into 4 zones and the perforator pattern was studied. The clinical study was done in the case series of the paraumbilical perforator based abdominal flaps, done in the department. The flaps were based on the perforators in all the zones of paraumbilical region studied.

Results and Conclusion: The commonest position of the paraumbilical perforator was analysed. It was found that the paraumbilical perforator based abdominal flaps can be harvested in any zone, in any direction. The versatility of flap design, with comfortable and amiable positioning of the upper limb with abdomen, makes these flaps reliable and a “user-friendly” option in the reconstruction repertoire of the upper limb defects.

Key words: Paraumbilical perforator based abdominal flaps, Umbilical perforator zones.

INTRODUCTION

Primary healing by accurate apposition is considered the ideal for epithelial wounds, and intestinal anastomoses should be no different. However, most anastomotic techniques do not aspire to accurate realignment and consequently depend on secondary healing. Most intestinal anastomoses heal uneventfully due to the relatively profuse blood supply of the bowel and the fact that the process of healing is hidden within the abdomen. Intestinal anastomoses heal in a series of overlapping phases: Lag phase (days 0–4), in which the acute inflammatory

response clears the wound of debris, phase of fibroplasia (days 3–14), in which fibroblasts proliferate and immature collagen are laid down, maturation phase (day 10 onwards), in which collagen remodels.^[1] Intestinal anastomoses have little intrinsic resistance to distension, and longitudinal distraction is weak until collagen deposition is established. Extrinsic support is required during the lag phase to maintain tissue continuity. The surgeon's role is to provide support (usually by inserting sutures or staples) and to ensure optimal conditions for subsequent healing. Although the anastomotic technique is the single most important determinant of outcome, a number of other factors affect healing; if these combine to make the risk of anastomotic failure high, the wisdom of performing an anastomosis should be questioned.^[2] A number of anastomotic techniques are available but, because all compromise healing, none can be considered perfect. The optimal method of intestinal anastomosis would: Promote primary healing by achieving accurate alignment of the divided bowel, cause minimal disruption of local

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vasculature, incorporate the minimum amount of foreign material, not implant malignant cells at the anastomosis, and not enhance the risk of metachronous cancers. In the 90s, different studies were conducted to find the fact that a single-layered extra mucosal anastomosis is comparable to double-layered anastomosis as far as the outcome is concerned and costs less time and money.^[3] Same were the findings of Law *et al.* in colorectal anastomoses. Lower incidence of the leak was supposed to be due to less amount of foreign body (suture material), introduced at the site of surgery, and better vascularity of cut ends of the bowel.^[4]

Aim

The aim of the study was to compare the efficacy of single-layered versus double-layered intestinal anastomosis.

MATERIALS AND METHODS

This prospective comparative study was conducted at the Department of General Surgery, Government Theni Medical College Hospital. Patients were selected randomly as per inclusion and exclusion criteria and divided into two groups. Both gender >18 years were considered. Patient informed consent was obtained before surgery.

Patients requiring intestinal resection and anastomosis were screened for the study. Enrolled patients were subjected to physical examination, routine blood investigations and imaging (ultrasonography or computed

tomography of the abdomen) as appropriate. Small gut requiring anastomosis and having edema, inflammation, ulcers, some possibility of post-operative ischemia or scarring were not included to avoid the influence of these factors on the outcome. Patients were assigned to the double-layered (Group A) or single-layered (Group B) randomly.

All two-layer anastomosis was constructed with 3-0 polyglycolic acids, round body needle, suture for first running trans mural layer and 3-0 silk, round body needle, suture for inverting, interrupted, and seromuscular second layer. Each single-layered anastomosis was performed using a continuous 3-0 polypropylene, round body needle, suture starting at the mesenteric border. All layers of the gut wall except for mucosa were taken up in the suture. Each bite was taken at least 6 mm or more from the margin of the bowel wall (larger bite at the mesenteric border to avoid leak). Each stitch advanced by 5 mm only. It was ensured that gut wall ischemia does not occur due to tightening of the suture and the pull was just enough to make the closure watertight. Time recording of anastomosis began with the start of first suture application and ended with the cutting off the excess suture material of the last stitch.

RESULTS

In this study, 80 cases were included; 40 patients in each group were randomly allocated. There was no statistical difference noted in gender and age of the two groups. The mean age of Group A was 44.26 years and Group B was 43.12 years. Majority of the patients were males in both groups [Table 1]. Maximum cases are in ileostomy closure in both groups. Meantime taken for anastomosis construction in single-layered method was 16.56 min while it was 24.12 min in double-layered method which is a statistically significant difference [Table 2]. Anastomosis material cost for double-layered was 350 INR and single-layered cost Rs. 650. Mean hospital stay in single-layered group was 8.2 days as compared to 12.1 days in a double-layered group. Most a common complication in both the groups has been wound infection where anastomosis was performed to treat intestinal perforation.

Table 1: Characteristics of both groups

Variables	Double-layered	Single-layered
Age		
Mean±SD	44.26±4.28	43.12±2.98
Gender		
Male	26	24
Female	14	16
Diagnosis		
Ileostomy closure	22	24
Perforations	9	11
Bowel ischemia	2	2
Trauma	3	2
Others	4	1

SD: Standard deviation

Table 2: Characteristics of patients undergoing single-layered extramucosal anastomosis versus double-layered anastomosis

Variables	Double-layered	Single-layered
Leaks	2	1
Abscess	1	1
Meantime taken for anastomosis (in min)	16.56±0.98	24.12±2.31
Length of stay (days)	8.2	12.1
Cost (Rs.)	350	650

DISCUSSION

The most important factors in the creation of a bowel anastomosis are meticulous technique, gentle tissue handling, adequate apposition of bowel ends, good blood supply, and absence of tension or distal obstruction.^[5] As evident from randomized trials, no differences in rates of leakage, duration of hospital stay, and overall morbidity have been noted between stapled and hand-sewn anastomosis.^[6] Interrupted sutures have no advantage over continuous sutures; however, evidence for this comes from retrospective studies only.^[7] The conventional sutured anastomosis may be performed either in a double-layered or a single-layered. The double-layered intestinal anastomosis was formulated in the early 19th century by Travers B in his experimental work.^[8]

In Khan RAA series, the arithmetical mean duration required to perform an anastomosis procedure was 20 min for single-layered and 35 min for double-layered.^[9] In Burch ET series duration required to perform a single-layered anastomosis was 20.8 min and 30.7 min for double-layered.^[10]

The majority of studies uniformly favor single-layered in preference to double-layered anastomoses.^[11,12] The single-layered anastomosis was first described by William. Since then, different single-layered anastomotic techniques have been invented. Connell described his continuous inverting suture in 1892. Single-layered continuous suture was reported later on by many authors.^[10-14] In 1951 Gambee designed a stitch that apposed both the serosa and the mucosa, forming a single-layered anastomosis.^[15] All of these techniques, in essence, create the inverted intestinal anastomosis. They differ in using either interrupted or continuous sutures and whole intestinal wall thickness sutures or extra mucosal sutures.

The study conducted by Ordorica-Flores *et al.* intestinal leakage was reported in 5% in single-layered and 7% in the double-layered anastomosis.^[16] In the study conducted by Askarpour *et al.*, intestinal leakage was found in 1.6% in single-layered and 6.3% in the double-layered anastomosis.^[17] Saboo *et al.* reported intestinal leakage in 10 and 6.66% and Garude *et al.* reported it in 5.3 and 4% in single- and double-layered anastomosis, respectively.^[18,19]

The cost difference of sutures used in two methods was considerable, and it is dramatic if compared with staplers. In today's cost-conscious environment, it is an important finding in favor of single-layered technique.

CONCLUSION

To conclude that single-layered anastomosis is effective, safe, and successful, of less operative, less hospital stay, and valuable cost-effectiveness.

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