

## Evaluation of Different Types of Suture Materials for Midline Abdominal Closure.

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**Abstract:** The prime purpose of a suture is to hold the wound edges together until it has healed sufficiently to withstand stress and strain on its own. The varieties of sutures are increasing day by day and it is posing an important task before surgeons to select an ideal suture material. The aim of this study is to know which suture material is most reliable for midline abdominal closure in terms of delayed absorption, tensile strength and minimal tissue reaction and at the same time cost effective. The suture materials used in this study are Polyglactin 910 (Vicryl), Pyrrolidine-2-carboxylic acid (Proline), Polyamide (Nylone) and Polydioxanone (PDS). The clinical study was carried out in 180 patients divided into three groups. Group 1 consists of 60 clean and uncontaminated cases. Group 2 consists of 80 contaminated and infected cases. Group 3 consists of 40 undernourished and cachectic cases. Each group is divided into four subgroups for each suture material. Total wound complication rate was different for different suture materials in different groups. On clinical evaluation PDS was found to be suture of choice in group 1 cases, whereas Nylone is the suture of choice in group 2 and group 3 cases.

**Keywords:** Midline abdominal closure, Nylone, Polydioxanone, Proline, Vicryl.

### I. Introduction

Sutures are most valuable, indispensable, and inseparable tool in the armamentarium of surgeons. The varieties of sutures are increasing day by day and it is posing an important task before surgeons to select an ideal suture material. It is now believed that the criteria for selection of suture material should not be its mechanical properties alone. The suture material is not an inert substance. When implanted in a tissue, there are complex chemical and biological interactions occur at the site of implantation between the suture and the tissue. The interactions may differ from tissue to tissue in same species (Case, et al, 1976)(1). Before selecting suture materials for different types of tissues, their nature must be properly understood. An ideal suture material should have certain optimal qualifications (Anscombe, 1970)(2) it should have adequate tensile strength, to hold divided tissues in apposition as long as necessary to prevent separation and stretching.

The ideal suture sought by Moynihan (1920)(3) was to be sufficient to hold the parts together, be absorbed as soon as its work was finished, be free from infection and be non irritant.

Agrawal et al (1990) worked on role of different suture material in tissue susceptibility to infection according to him physical structures of suture played an important role(4).

Hodgson et al (2000) demonstrated that PDS is associated with less chronic wound pain and suture sinuses compared to others(5).

Vinay Gaikwad(2009) in a study of 64 patients undergoing midline laparotomy found high incidence of wound dehiscence in PDS group and high incidence of scar pain in Nylone group(6).

The midline laparotomy incision is extremely standardized and easy to perform, yet there has been considerable variation in the method of the repair of this incision. The ideal suture should prevent incisional hernia and wound dehiscence, without increasing wound infection, wound pain or the formation of suture sinus.

### II. Materials And Methods

A clinical evaluation of polyglactin 910 (Vicryl), Pyrrolidine-2-Carboxylic acid (Proline), Polyamide (Nylon) and Polydioxanone (PDS) sutures has been done in Indian conditions in 180 patients divided in three groups.

Group 1-60 clean and uncontaminated cases divided in four subgroups of 15 each(1A, 1B, 1C and 1D)

Group 2-80 contaminated and infected cases divided into four subgroups of 20 each(2A, 2B, 2C and 2D)

Group 3-40 undernourished and cachectic patients divided into four subgroups of 10 each(3A, 3B, 3C and 3D)

Midline abdominal incisions were closed with Vicryl No.1 in subgroup A, Proline No 1 in subgroup B, Nylone No 1 in subgroup C, and PDS No 1 in subgroup D.

### **III. Results**

Post-operative pain was found to be less in severity and duration with PDS and next with Vicryl compared to Prolene and Nylon in all groups.

The post operative inflammation was less in incidence and severity with PDS in group 2 and group 3, whereas post operative inflammation was less with vicryl in group 1.

Post operative infection was less in incidence and severity with PDS compared to Vicryl, Prolene and Nylon in group 1 and 2 whereas group 3 shows equal post operative infection rate.

Post operative wound dehiscence was found to be less in incidence and degree with Prolene and Nylon compared to Vicryl and PDS. No wound dehiscence seen with Prolene and Nylon in group 1. Minimum wound dehiscence was seen with Nylon in group 2 and again no wound dehiscence with proline in group 3.

### **IV. Conclusion**

Hence on clinical evaluation, polydioxanone (PDS) was found to be suture of choice compared with polygalactin 910 (Vicryl), Pyrrolidine-2 carboxylic acid (Prolene), and Polyamide (Nylon) in patients undergoing elective surgical procedures through midline abdominal incisions (clean and uncontaminated cases) i.e group 1 patients. Whereas patients of group 2 and group 3 i.e patients with preoperative established infection (contaminated cases), these are patients coming in emergency department for laparotomy and in undernourished and cachectic patients undergoing routine surgery, Nylon was found to be suture of choice in compare with Vicryl, Prolene and PDS. With increasing experience and handling of suture materials, time is not far away that PDS will replace all other suture material for midline abdominal closure in clean and uncontaminated cases and Nylon will replace all other suture material for midline abdominal closure in contaminated cases and undernourished cachectic patients.

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