

## Comparative Analysis of Incisional Wound Closure Techniques in Plastic Surgery Practice Between Single Subcutaneous/Subdermal Continuous Polyglactin Suturing Versus Layer-By-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing: A Comprehensive Literature Review

Hawari Iskandar<sup>1</sup>, Ahmad Fawzy<sup>2</sup>

<sup>1,2</sup>Department of Surgery, Faculty of Medicine University of Jenderal Soedirman-Margono Soekarjo County Hospital, Indonesia

### ABSTRACT

**Introduction:** Wound closure technique has some variations in reconstructive and plastic surgery. The use of ideal suture material and technique for subcutaneous tissue closure is needed to be established in the current clinical practice to enhance the surgical outcome.

**Methods:** This literature review was compiled using information from numerous open access web databases. Data were compiled and analyzed.

**Results and Discussions:** In term of tensile strength, single layer subcutaneous suture with polyglactin has superior outcome than multi-layer suture combining polyglactin subcutaneous suture and polypropylene interrupted cutaneous suture. In aesthetic consideration, a single-layer subcutaneous closure has better outcome. Previous studies showed there were no significant difference between the two techniques in term of patients satisfaction.

**Conclusion:** The single layer subcutaneous continuous suture with polyglactin and multiple layer subcutaneous suture with combining continuous polyglactin suture and polypropylene interrupted suture has each advantage and need to be considered by surgeon about the wound closure effect and long term prognostic such as cosmetic and satisfaction of the patient.

### ARTICLE DETAILS

**Published On:**  
06 November 2023

**Available on:**  
<https://ijmscr.org/>

### INTRODUCTION

One of the primary goals of wound management is optimal cosmetic outcome. Wound closure technique has some variations in reconstructive and plastic surgery. Some literatures said wound closures should start with simple approach, but in some circumstances they need different sophisticated techniques for better outcomes. A proper wound closure plays an important role to avoid infection or contamination, to reduce the rate of dehiscence, scarring, skin necrosis, and tension.<sup>1</sup>

Clinicians have been utilizing many materials and devices in wound closure such as are surgical sutures, staples, surgical zippers, clips, adhesive tape or adhesive strips, tissue adhesives or laser bonding. These materials and devices are widely used to close cutaneous or skin wounds. Sutures contribute to the largest percentage of devices used for wound closure, yet there is no standardized method for securing them.<sup>2</sup> Skin suturing is one of the basic procedures in all

surgeries. It promotes early wound healing, which is an essential process of scar formation. The permanent scar formed after wound healing will significantly affect the mental health, personal relationships, and quality of life of patients.<sup>3</sup>

Choosing continuous or interrupted techniques, the skin layers involvement, either they are all layer transdermal or subcuticular, and types of suture material play essential roles in the outcomes of wound closures. Most of times, in general, interrupted sutures involve the whole skin layer. Continuous subcutaneous sutures, contrasting with continuous all layer transdermal sutures, were arranged immediately below the external skin layer and offered benefits of better aesthetic outcomes.<sup>4</sup>

Practicians should use ideal suture material for subcutaneous tissue closure to enhance the surgical outcome. The structural properties and coating of the suture materials also affect the healing process and prevent failure which leads to wound

# Comparative Analysis of Incisional Wound Closure Techniques in Plastic Surgery Practice Between Single Subcutaneous/Subdermal Continuous Polyglactin Suturing Versus Layer-By-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing: A Comprehensive Literature Review

disruption and other complications; with known rates ranging between 3 and 30%. The risk of these complications is less in subcutaneous closure application. Polyglycolic acid and polyglactin sutures for soft tissue approximation show adequate tensile strength. Polyglactin suture has a minimal inflammatory response and is completely absorbed by days 56-70.<sup>5</sup>

Any surgical defect should be closed with primary intention in order to counteract tissue pulling forces and prevent a gaping scar upon healing. Subcutaneous sutures hold important parts in minimizing or preventing dead space. Performing interrupted absorbable sutures for closure in layers is a widely accepted choice. The surface may then be closed with interrupted or continuous sutures. Intradermal sutures have been demonstrated to effectively prevent the consequences of remaining dead space.<sup>6</sup> Meanwhile, closure of the subcutaneous dead space by multi-layer suturing with absorbable sutures reduces the formation of seromas in general surgery.<sup>7</sup>

## METHODS

We compiled this literature review and analyzing information from numerous web databases. Our inclusion criteria included: (1) the journal was open accessible and (2) the articles which were matched and relevant to the subject matter covered in this literature review. We were using “Single Layer Subcutaneous Suture”, “Multi-Layer Subcutaneous Suture”, and “Polyglactin Subcutaneous Suture” keywords in the literature search on PubMed, Google Scholar, and Elsevier. Data were collected, organized, and summarized.

## RESULTS AND DISCUSSIONS

### MECHANICAL STRENGTH

Surgeons were challenged by the fact that many tissue elements and suture materials have to be used in many different ways. An incisional wound is initially held together with suture material, but it must gain enough inherent strength to maintain closure. Understanding the process of strength gain is fundamental to assessing the safety of patient activity.<sup>8</sup>

There are several biomaterials that have been approved for use in suturing and they are applied based on the wound depth and the type of wound closure needed. In addition, in order to choose the appropriate suture technique, the use of suture materials with suitable physical and mechanical properties also increases and accelerates proper wound healing. Absence of proper wound approximation often results in blood and serum stasis and delays wound healing.<sup>9</sup>

*Single Subcutaneous/Subdermal Continuous Polyglactin Suturing*

Continuous subcutaneous sutures do not have stitches over the epidermal layer, resulting in no punctate scarring. Continuous sutures reduce superficial wound dehiscence and improve cosmetic satisfaction. When dealing with skin closure in high tension areas, subcutaneous continuous sutures are superior in reducing the complications of the wound opening dehiscence.<sup>10</sup>

Single subcutaneous continuous polyglactin sutures were shown to retain their tensile strength up to day 10 but lose most of it by day 14. In one recent study, polyglactin sutures had the greatest tensile strength as well as excellent knot holding capacity. When a polymer is used to make a suture, its structural qualities, such as molecular weight, level of entanglement, forces acting between molecules, and hydrogen bonding, might affect the polymer's performance, drawability, and strength. An inevitable component of uncomplicated healing is clot formation and its stabilization in the recovery phase immediately after surgery.<sup>11,12</sup>

The use of polyglactin suture improves durability and extends the time that the suture can be left. In one study, the absorption of this suture began approximately at 40 days and was nearly complete by day 70. At 90 days, no polymer remained in the tissue.<sup>11,13</sup>

Mechanical stability of single subcutaneous continuous polyglactin suture also great. There is a study to test the stability of suture with different pH experiment and the results are stability of sutures significantly increased was observed after day 10. Therefore, the stability of this suture also influenced by the material of suture itself which were using polymers. Polymer chains into a rigid network, increases the molecular weight and leads to a hard and brittle product. The stability of a polymer against oxidation is always improved.<sup>11</sup>

*Layer-by-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing*

Absorbable sutures are characterized by the loss of most of their tensile strength within 60 days after placement. They should be absorbed with little or no tissue reaction at a predictable rate appropriate for the duration of the needed tissue support. They are used primarily as buried sutures to close the dermis and subcutaneous tissue and to reduce wound tension. Absorbable sutures traditionally have not been recommended for outer skin closure, primarily due to unsightly railroad track formation.<sup>14</sup>

Non-absorbable sutures are characterized by their resistance to degradation by living tissues, and they are most useful in percutaneous closures. Surgical steel, silk, cotton and linen are examples of natural materials. Synthetic non-absorbable monofilament sutures are most commonly used in cutaneous procedures and include nylon, polypropylene and polybutester.<sup>14</sup>

# Comparative Analysis of Incisional Wound Closure Techniques in Plastic Surgery Practice Between Single Subcutaneous/Subdermal Continuous Polyglactin Suturing Versus Layer-By-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing: A Comprehensive Literature Review

## Comparison of Tensile Strength Between Single Layer Continuous Subcutaneous/Subdermal Polyglactin Suture and Layer-by-Layer Continuous Subcutaneous Polyglactin Suture with Polypropylene Interrupted Skin Suture

Subcutaneous suturing has been used in wound closure and suddenly increased worldwide in recent decades, probably in response to the demand for scarless surgery and attention to cosmesis. Initially, surgeons used natural absorbable catgut-like sutures for subcutaneous stitching. However, these fell out of favour as they fail to hold the wound margins after 7 days. Some surgeons also tried to use primitive non-absorbable threads like silk, but these were quickly discontinued due to the very high rate of wound infection as silk threads are mostly braided.<sup>15</sup>

Using only absorbable sutures have been proven to lose 50 percent of their tensile strength in tissues within 60 days, resulting in degradation. Among them, natural absorbable sutures degrade due to proteolysis, while synthetic absorbable sutures including the polyglactin degrade due to hydrolysis. Nonetheless, very fine and rapidly absorbable polyglactin threads remain one of the most popular threads used for subcutaneous suturing.<sup>16</sup>

A non-absorbable suture like nylon or polypropylene needs to be removed from the wound site within 5-7 days (12 days maximum) because these threads start to produce delayed inflammatory reactions after 10 days, added to which their removal becomes cumbersome due to the formation of suture granulomas over the suture line.<sup>15</sup> Non-absorbable sutures offer long-term support for tissue fixation. However, they require secondary surgical removal and often results in poor healing and scarring of sutured wounds.<sup>17</sup>

Surgeons familiarly used polyglactin sutures for closing the epidermis, ligating superficial blood vessels, and suturing subcutaneous tissue. Polyglactin materials are absorbed by hydrolysis, with 75% still present at 2 weeks, 25% at 1 month, and is completely absorbed by 56 to 70 days and thus useful for soft tissue approximation. Meanwhile using a combination with polypropylene skin suture, a widely utilized nonabsorbable synthetic monofilament, tends not to lose tensile strength through degradation and can be used on skin to diminish reactivity or, in a contaminated field, to minimize delayed sinus formation and extrusion.<sup>18</sup>

**Table 1. Literatures search for tensile strength on different subcutaneous suture technique**

Title	Study ID	Results
Individualized Wound Closure— Mechanical Properties of Suture Materials	Polykandriotis <i>et. al.</i> , 2022. <sup>19</sup>	The suture materials displayed different initial tensile strengths (in order from stronger to weaker streght: polyglecaprone, polyglactin, polydioxanone, polyamid, polypropylene). In comparison, materials performed variably in terms of resistance to crush loading. The findings were statistically significant.
Biomechanical evaluation of suture materials used for abdominal fascial closure	Ignacio <i>et. al.</i> , 2021. <sup>20</sup>	No significant changes were observed in maximum tensile force or extension within the different suture groups. Regarding deformation, polypropylene and polydioxanone did not exhibit alterations in their curve behavior, while polyglactin 910 did exhibit changes compared to the control group.

From literature search of mechanical strength, single layer subcutaneous suture with polyglactin has superior outcome than layer-by-layer suture combining polyglactin subcutaneous suture and polypropylene interrupted cutaneous suture. The data provided by literature because absorbable sutures such as polyglactin have been proven to lose 50 percent of their tensile strength in tissues within 60 days, resulting in degradation, meanwhile a non-absorbable suture like nylon or polypropylene needs to be removed from the wound site within 5-7 days (12 days maximum) because these threads start to produce delayed inflammatory reactions after 10 days. This concludes that with removal of the suture it can decreased the tensile strength of suture.<sup>19,20</sup>

## AESTHETIC OUTCOMES

The suturing technique might influence the final aesthetic outcome. Currently, because of a lack of evidence, the choice of suturing technique is largely dependent on the surgeon's preference. The evaluation of aesthetic outcome has always been challenging because no gold standard exists.<sup>21</sup> The closure of the lower part of the subcutaneous tissue (if thickness is >2 cm) reduces wound disruption rate by decreasing the rate of seroma. This is because subcutaneous tissue closure eliminates the dead space and reduces tension on the skin layer, thereby lowering wound complications and improving cosmetic outcomes.<sup>22</sup>

The perspective of beauty is very subjective. Body image and operation scar are closely related to quality of life. The psychosocial effects of scarring is well documented. Patients

# Comparative Analysis of Incisional Wound Closure Techniques in Plastic Surgery Practice Between Single Subcutaneous/Subdermal Continuous Polyglactin Suturing Versus Layer-By-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing: A Comprehensive Literature Review

report having reduced self-esteem, being stigmatized, and having disrupted daily activities, anxiety and depression. The physical effects of scarring include dryness, itchiness, stiffness, tenderness and pain. Thus, managing the healing process is particularly important to ensure wounds are managed appropriately to heal rapidly, with minimal pain and with a cosmetically acceptable appearance.<sup>23</sup>

## Single Subcutaneous/Subdermal Continuous Polyglactin Suture

In plastic surgery, polyglactin is mostly used to approximate wound edges with dermal and subcuticular sutures, and rapidly absorbed counterparts are commonly used for skin closure. Polyglactin was found to be associated with a higher rate of wound infections and granuloma formation with comparable results for erythema and hypertrophy.<sup>23</sup> The suture also had a significant association with the occurrence of hypertrophic scar tissue. Postoperative patients who used multifilament suture in the form of polyglactin can cause high skin strain, thus increasing the synthesis of collagen that causes hypertrophic scar tissue.<sup>22</sup>

For deeper wounds, closure of subcutaneous dead space is generally desirable to optimize cosmesis and minimize the risk of wound infection. This must be done with an absorbable suture in a configuration in which the knot points into the depths of the wound rather than protruding from it. This is achieved by passing the needle from deep to superficial then superficial to deep. If possible, the superficial component of the suture should pass through the dermis, as this is the collagen-rich layer on which scar integrity depends. If these sutures can efficiently approximate the dermis, a subsequent layer of cutaneous sutures will be under minimal tension, thus reducing the risk of an expanded scar. In some cases, it may suffice simply to apply adhesive strips to the epidermal layer. Continuous sutures flatten a convex wound and tend to straighten out curved incisions. The continuous suture will deform the surface when the suture bites are placed irregularly. Irregular sutures result from unequal suture depth placement, unequal length of suture passes and nonradial suture placement.<sup>24</sup>

## Layer-by-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing

Where cosmetic results are important, close and prolonged apposition of wounds and avoidance of irritants will produce the best results. Therefore, using the smallest inert monofilament suture materials such as polypropylene is one of the best choices. Monofilament sutures also induce significantly less tissue reaction than multifilament sutures. Tissue reaction to nonabsorbable sutures subsides and remains relatively acellular as fibrous tissue matures and forms a dense capsule around the suture.<sup>25</sup>

In multi-layer suture with cutaneous simple interrupted sutures, different from percutaneous running sutures, have to penetrate the epidermis to cause more inflammation. Continuous cutting and compression of soft tissue under normal skin can increase fibrous tissue during healing and centipede-like scarring. In addition, the suturing depth, width, and tensile strength might be difficult to be even because of the use of separate stitches, contributing to less precise epidermal alignment and a weakened cosmetic result.<sup>10</sup>

## Comparison of Aesthetic Outcomes Between Single Layer and Layer-by-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing

To minimize scarring, suturing the subcutaneous layer of tough connective tissue will hold the skin edges in close approximation. In a single-layer subcutaneous closure, less evidence of scar gaping or expansion may be seen after a period of 6 to 9 months than is evident with simple skin closure. The surgeon takes continuous short lateral stitches beneath the epithelial layer of skin. Either absorbable or nonabsorbable sutures may be used. If nonabsorbable material is chosen in single layer or multi-layer suture, one end of the suture strand will protrude from each end of the incision, and the surgeon may tie them together to form a “loop” or knot the ends outside of the incision. A punctate scar is usually seen on the skin surface and a “railroad track” or “crosshatch” appearance on the wound may result on non-absorbable interrupted skin suture.<sup>26</sup>

**Table 2. Literatures search for aesthetic outcomes on different subcutaneous suture technique**

Title	Study ID	Results
Comparing running vs interrupted sutures for skin closure: A systematic review and meta-analysis	Luo <i>et. al.</i> , 2023. <sup>10</sup>	This systematic review indicated the superiority of both transdermal and subcutaneous continuous sutures with absorbable materials over interrupted sutures with non-absorbable material in skin closure in terms of wound healing and cosmetic appearance
Use of a Buried Intradermal (Subcutaneous) Running Suture for	Lin <i>et. al.</i> , 2019. <sup>27</sup>	The superior cosmetic outcome offered by buried intradermal suture as an alternative

# Comparative Analysis of Incisional Wound Closure Techniques in Plastic Surgery Practice Between Single Subcutaneous/Subdermal Continuous Polyglactin Suturing Versus Layer-By-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing: A Comprehensive Literature Review

Superficial Repair to Optimize Cosmetic Outcome		superficial repair method compared to the simple interrupted or running suture techniques with 2 patient cases, who had defects on the temple and shin.
---	--	---

In aesthetic outcome, a single-layer subcutaneous closure, less evidence of scar gaping or expansion may be seen after a period of 6 to 9 months either using absorbable or nonabsorbable suture material. The one thing to note is, when using multilayer suture with polypropylene as cutaneous suture it will make skin surface a “railroad track or crosshatch” appearance, while the absorbable material not. From study by Luo, it result was there is superiority on subcutaneous continuous sutures with absorbable materials over interrupted sutures with non-absorbable material in skin closure in terms of wound healing and cosmetic appearance. The same results happen on study by Lin which said superior cosmetic outcome offered by subcutaneous absorbable suture as alternative superficial repair method compared to the simple interrupted non-absorbable techniques.<sup>10,27</sup>

## PATIENT SATISFACTORY

Patient satisfaction is a key indicator for healthcare quality, and for many years, a measure of health outcomes. The main aim of measuring consumer perception of quality of healthcare services is to utilize these measures to enhance and improve the delivery of care. Patient satisfaction is an individual’s perception and evaluation of the care they receive in a healthcare setting. It is very important to understand patient satisfaction because of its association with retention to care and medication adherence, which in turn impact the health and quality of life (QoL) of the patients. Patient satisfaction is an important component of patient-centered care, aimed at improving health outcomes by reducing the gaps between patient perceptions and healthcare needs. Good management of wound and aids in the healing process also important because of the impact on the quality of life of the individual and the society at large. However, in previous studies, wound care education from clinicians is often deemed unsatisfactory, for example, in post-operative wound after-care.<sup>28</sup>

## Single Subcutaneous/Subdermal Continuous Polyglactin Suturing

In single subcutaneous continuous polyglactin suture, the knots hold unidirectional absorbable cones of polyglactin acid in place. These cones, which are actually a copolymer of glycolic acid and lactic acid, provide the tension loading for soft tissue elevation. The cone anchors the suture and allows in-growth of soft tissue. Continuous suturing technique is more economical than the interrupted suturing technique as it requires lesser number of suture material, needs lesser time and is associated with lesser pain experience.<sup>28</sup>

Based on one research that 17 patients who underwent midface repositioning with this suture, have been favorable. Patient satisfaction was 90% at 9 months; resuspension of the sutures was necessary in only 1 case.<sup>29</sup> Masson et al. observed that the polyglactin group had considerably less pain and more comfortable on the second postoperative day (PND).<sup>30</sup> Kettle at al showed that the group with continuous suturing with polyglactin technique had overall experienced more satisfied.<sup>31</sup>

## Layer-by-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing

For multi-layer suture combining polyglactin subcutaneous suturing and polypropylene interrupted skin suture has an increase in pain perception in 10 days postoperatively in which nonabsorbable polypropylene thread was used. The recovery time of patients also longer and stayed longer in hospital. The satisfaction of suture also influenced by patient comfort about the postoperatively suture. Some research said that there are people feel not comfortable as the suture should be removed after.<sup>32</sup>

## Comparison of Patient Satisfactory Between Single Layer and Layer-by-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing

**Table 3. Literatures search for patient satisfaction on different subcutaneous suture technique**

Title	Study ID	Results
Tying Knots Between Wound Closure Materials	Yalcin <i>et. al.</i> , 2022. <sup>23</sup>	Polyglactin is particularly important for wound closing surgery, if used, the non-absorbable alternatives such as polypropylene and polyamide require additional hospital stay and intervention under general anesthesia or sedation for removal, which is by-passed if rapidly absorbed polyglactin is used

# Comparative Analysis of Incisional Wound Closure Techniques in Plastic Surgery Practice Between Single Subcutaneous/Subdermal Continuous Polyglactin Suturing Versus Layer-By-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing: A Comprehensive Literature Review

The Influence of the Type of Surgical Thread and Suture in the Open Carpal Tunnel Syndrome Surgery	Jose <i>et. al.</i> , 2017. <sup>32</sup>	Advantage in the use of nonabsorbable suture due to the lower occurrence of inflammation and postoperative pain in wound closure subcutaneous suture of CTS
Comparison of Subcuticular Suture Materials in Cesarean Skin Closure	Hasdemir <i>et. al.</i> , 2015. <sup>33</sup>	Absorbable polyglactin was used in 108 patients and nonabsorbable polypropylene was used in 142 patients. Wound complication rates such as pain and infection were similar. There was no difference between groups in terms of postoperative pain, need for additional analgesic use, late phase pain, and itching at the scar.

The literature about patient satisfaction for two techniques is hard to find and need more study. Jose *et. al.* in comparing material suture to skin closure after CTS surgery found that advantage in the use of nonabsorbable suture due to the lower occurrence of inflammation and postoperative pain in wound closure subcutaneous suture. Meanwhile for hospital stay and comfort of patient being studied by Yalcin *et. al.* which found that polyglactin is particularly important for wound closing surgery, if used, the non-absorbable alternatives such as polypropylene and polyamide require additional hospital stay and intervention under general anesthesia or sedation for removal, which is by-passed if rapidly absorbed polyglactin is used. The study by Hasdemir *et. al.* not find any significant difference between two techniques on wound closure of obstetric patient.<sup>23,32,33</sup>

## POTENTIAL FACTORS TO CHOOSE SUTURING TECHNIQUES

In primary wound closure, sutures are the standard of care. There are two types of sutures, absorbable and non-absorbable. Non-absorbable sutures are preferred because they provide great tensile strength, and the body's chemicals will not dissolve them during the natural healing process. Non-absorbable sutures are used primarily to close superficial wounds; whereas, absorbable sutures can be placed in a double layer closure for deeper wounds. In doing so, absorbable sutures help decrease the tension and better approximate the wound edges. This will allow for a lower risk of wound dehiscence and a more aesthetically pleasing outcome. Synthetic sutures tend to have a problem with "memory." That is, they tend to retain the shape of their packaging. This can potentially make it difficult to manipulate the suture during wound closure.<sup>34</sup>

The choice of suture and technique depends on the type of wound, depth, degree of tension, and desired cosmetic results. Simple interrupted sutures have the advantage of more cosmetically appealing results, as the use of separate stitches allows for a better approximation of the skin and fascia. They provide greater tensile strength and have less risk of injuring cutaneous circulation. Also, in the case of an infection, the entire length of sutures would not need to come out.<sup>34</sup>

## FUTURE DIRECTIONS AND CHALLENGES

The use of different suture method with different suture material has to be choice by plastic and reconstructive surgeon and considering the aesthetic outcome, wound closure, and patient satisfactory on long time effect. There are some contradictive results on some literature about these outputs, so better to have more research about each technique. Along with development of medical technologies, there are also some techniques could be considered to subcutaneous closure and how to improve the quality of each technique. Meanwhile, challenges are the patient tendency to choose medical intervention they want so it can be biased by doctor's perspective.

## CONCLUSION

The single layer subcutaneous continuous suture with polyglactin and layer-by-layer subcutaneous suture with combining continuous polyglactin suture and polypropylene interrupted suture has each advantage and need to be considered by surgeon about the wound closure effect and long-term prognostic such as cosmetic and satisfaction of the patient. From our findings, surgeon who need some tensile strength on wound closure and better aesthetic outcome could use the the single layer subcutaneous continuous suture with polyglactin, meanwhile patient satisfaction with two techniques do not have large significant.

## REFERENCES

- I. Simman R. Wound closure and the reconstructive ladder in plastic surgery. *Journal of the American College of Certified Wound Specialists*. 2009;1(1):6-11. doi:10.1016/j.jcws.2008.10.003.
- II. Huang Y. A Comparison of the Properties and Performance of Polyvinylidene Fluoride and Polypropylene Barbed Sutures in Tendon Repair. Master's Thesis, North Carolina State University, Raleigh, NC, USA, 2017.
- III. Janis J, Harrison B. Wound healing: part II. Clinical applications. *Plast Reconstr Surg*. 2014;133:383e-392e. doi: 10.1097/PRS.0000000000000077.

# Comparative Analysis of Incisional Wound Closure Techniques in Plastic Surgery Practice Between Single Subcutaneous/Subdermal Continuous Polyglactin Suturing Versus Layer-By-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing: A Comprehensive Literature Review

- IV. Shin TM, Bordeaux JS. How suture technique affects the cosmetic outcome of cutaneous repairs. *J Drugs Dermatol*. 2014;13:967-969.
- V. Ramalingappa P, Shivaramgowda R, Holavanahalli SrinivasaMurthy S. Optimizing techniques and suture materials for caesarean section. *Curr Top Caesarean Sect*. 2021;1–39. doi: 10.5772/intechopen.97930.
- VI. Abby SN, Biton A, Topaz M. The subcutaneous loop: a single suture technique for skin closure after superficial and subcutaneous surgery. *J Drugs Derm*. 2006;960-961.
- VII. Gaspar FJL, Hensler M, Vester-Glowinski PV, Jensen KK. Skin closure following abdominal wall reconstruction: three-layer skin suture versus staples. 2022;56(6):342-347.
- VIII. Ireton JE, Unger JG, Rohrich RJ. The role of wound healing and its everyday application in plastic surgery: a practical perspective and systematic review. *Plast Reconstr Surg Glob Open*. 2013;1(1):e10-e19. doi: 10.1097/GOX.0b013e31828ff9f4. PMID: 25289204; PMCID: PMC4174176.
- IX. AlSarhan MA. A systematic review of the tensile strength of surgical sutures. *j biomater tissue eng*. 2019;9:1-10. doi:10.1166/jbt.2019.2177.
- X. Luo W, Tao Y, Wang Y, Ouyang Z, Huang J, Long X. Comparing running vs interrupted sutures for skin closure: A systematic review and meta-analysis. *Int Wound J*. 2023;20(1):210-220. doi: 10.1111/iwj.13863. Epub 2022 Jun 17. PMID: 35715955; PMCID: PMC9797933.
- XI. Ojastha BL, Jeevitha M. An evaluation of the tensile strength of polyglactin sutures after immersion in different herbal mouthwashes: an in vitro study. *cureus*. 2023;15(8):e43407. doi: 10.7759/cureus.43407. PMID: 37706141; PMCID: PMC10496728.
- XII. Anushya P, Ganesh SB, Jayalakshmi S. Evaluation of tensile strength of surgical absorbable and nonabsorbable suture materials after immersion in different fruit juices: An in vitro study. *J Adv Pharm Technol Res*. 2022;13(Suppl 1):S108-S111. doi: 10.4103/japtr.japtr\_267\_22. Epub 2022 Nov 30. PMID: 36643124; PMCID: PMC9836114.
- XIII. Kudur MH, Pal SB, Sripathi H, Prabhu S. Sutures and suturing techniques in skin closure utures and suturing techniques in skin closure. *Indina J Dermatol Venereol*. 2009;75(4):425-434.
- XIV. Al-Mubarak L, Al-Haddab M. Cutaneous wound closure materials: an overview and update. *J Cutan Aesthet Surg*. 2013;6(4):178-188. doi: 10.4103/0974-2077.123395. PMID: 24470712; PMCID: PMC3884880.
- XV. Chatterjee, Shamita & Basu, Arghya. Methods of retaining the suture in a sub-cuticular stitch using non absorbable suture – innovations and diversity of techniques. *Indian Journal of Surgery*. 2013;75. 10.1007/s12262-012-0477-9.
- XVI. Dennis, C.; Sethu, S.; Nayak, S.; Mohan, L.; Morsi, Y.; Manivasagam, G. Suture materials—current and emerging trends. *J. Biomed. Mater. Res. A*. 2016;104: 1544–1559.
- XVII. Li J, Guan S, Su J, Liang J, Cui L, Zhang K. The development of hyaluronic acids used for skin tissue regeneration. *Curr. Drug Deliv*. 2021;18:836–846.
- XVIII. Miriam B, Al A. The Surgical Suture. *Aesthetic Surgery Journal*. 2019;39 (Supp 2):S67–S72.
- XIX. Polykandriotis E, Daenicke J, Bolat A, Gruner J, Schubert DW, Horch RE. Individualized wound closure—mechanical properties of suture materials. *Journal of Personalized Medicine*. 2022;12(7);1-12. doi:10.3390/jpm12071041.
- XX. Ignacio J, Elguea-Lizarraga O. Biomechanical evaluation of suture materials used for abdominal fascial closure. *Mater. Res. Express*. 2021;8. doi: 10.1088/2053-1591/ac1002.
- XXI. Noel D, Patrick B, Michael K, Schmidt K, Cooke F, Neary P, Michael B, Reynolds J. Prophylactic negative wound therapy in laparotomy wounds (PROPEL trial): randomized controlled trial. *International Journal of Colorectal Disease*. 2019;34. 10.1007/s00384-019-03398-9.
- XXII. Helmy M, El Khouly N, M ES. Effect of closure of subcutaneous tissue at cesarean section on wound complications and cosmesis Full Text Introduction. *Menoufia Med J*. 2022;35(1):250–255.
- XXIII. Yalçın CE, Demiröz A, Aydın Y. Tying knots between wound closure materials. *Cerrahpaşa Med J*. 2022;46(2):86-90.
- XXIV. Turner, R. Surgical management of acute lacerations. *Australian Journal for General Practitioners*. 2019;48:600-603.
- XXV. Nair RR, Achari SL, Sharma R, Thomas P, R PR. Essential and fundamental surgical suture techniques for aseptic rodent surgery. *ChemRxiv*. Cambridge: Cambridge Open Engage; 2023.
- XXVI. Ethicon Wound Closure Manual. 2021. Ethicon, Inc.
- XXVII. Lin RL, Wu EM, Hale EK. Use of a buried intradermal (subcutaneous) running suture for superficial repair to optimize cosmetic outcome. *J Drugs Dermatol*. 2019;18(5):481-482. PMID: 31141859.

## **Comparative Analysis of Incisional Wound Closure Techniques in Plastic Surgery Practice Between Single Subcutaneous/Subdermal Continuous Polyglactin Suturing Versus Layer-By-Layer Continuous Suturing with Polyglactin Subcutaneous Suturing and Polypropylene Interrupted Skin Suturing: A Comprehensive Literature Review**

- XXVIII. Wiebe N, Fiest KM, Dykeman J, et al. Patient satisfaction with care in epilepsy: How much do we know? *Epilepsia*. 2014; 55(3): 448-455. doi: 10.1111/epi.12537.
- XXIX. Paul MD. Barbed sutures in aesthetic plastic surgery: evolution of thought and process. *Aesthet Surg J*. 2013;33(3 Suppl):17S-31S. doi: 10.1177/1090820X13499343. PMID: 24084876.
- XXX. Bharathi A, Reddy DB, Kote GS. A prospective randomized comparative study of vicryl rapide versus chromic catgut for episiotomy repair. *J Clin Diagn Res*. 2013;7(2):326-30. doi: 10.7860/JCDR/2013/5185.2758. Epub 2012 Dec 24. PMID: 23543639; PMCID: PMC3592303.
- XXXI. Pooja T, Shweta M, Gunjan B. A comparative study of subcuticular and interrupted stitches for episiotomy. *IJRCOG*. 2018;7. doi:10.18203/2320-1770.ijrcog20184976.
- XXXII. José MSM, Xavier BC, Conceição FS, Mendes IO. The influence of the type of surgical thread and suture in the open carpal tunnel syndrome surgery. *Arq Bras Neurocir*. 2019;38:292–296.
- XXXIII. Hasdemir PS, Guvenal T, Ozcakil HT, Koyuncu FM, Dinc Horasan G, Erkan M, Oruc Koltan S. Comparison of subcuticular suture materials in cesarean skin closure. *Surg Res Pract*. 2015;2015:141203. doi: 10.1155/2015/141203. Epub 2015 Aug 27. PMID: 26413566; PMCID: PMC4564673.
- XXXIV. Azmat CE, Council M. Wound Closure Techniques. [Updated 2023 Jun 26]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK470598/>.