Polypropylene meshes in wounds inoculated with E. Coli; Pilot Study in New Zealand White Rabbit

Marco Aurelio Rendón Medina (dr.rendon1989@gmail.com)
Hospital General de México, Surgery resident´s experimental protocols.
José Manuel Fonseca Jiménez
Hospital General de México, Division Plastic Surgery Resident.
Luis Daniel López Fragoso
Hospital General de México, General Surgery Resident

Method Article

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Abstract

Abstract: Problem Statement: There is no consensus on the use of synthetic mesh in contaminated wounds. The last existing evidence overestimates use them. Is necessary to define whether they are safe in this type of injury. The reviewed studies are not comparable because the difference between integrated variables. The sample size and the conditions of each case are very different, and no meta-analysis is available. We propose an animal model to determine objectively whether they represent a risk for surgical site infection \(SSI). Objectives: To propose an animal model to study polypropylene meshes in infected wounds with E. coli.

Introduction

Definitions: Definition of surgical site infection \(SSI): is the infection that occurs within 30 days after surgery or within one year when an implant prostheses or graft is placed. Affects skin and subcutaneous tissue \(superficial incisional SSI) or deep soft tissues of the incision \(deep incisional SSIs) , and / or any organ or space manipulated during surgery \(SSI organs and spaces) .7 Classification of wounds: Clean wound when the tissue has no evidence of inflammation, and does not involve any mucosa. Clean-contaminated wound: when the procedure involves hollow viscera without spilling any content. Contaminated Wound: when some gut engages spilling its contents except large intestine. Dirty wound: pus, perforated viscera or any exposed wound for more than 4 hours. 8 Background: The use of prosthetic material represents an important advance in medicine. Ten years ago Luijendik et al demonstrated that mesh repair exceeded suture primary repair. \(1) Especially in treating defects of the abdominal wall. Ideally polypropylene meshes are used in clean wounds, and are absolutely contraindicated in wounds contaminated by their high risk of SSI. Recent studies with biologic meshes question this dogmatic statement. There are still non solved issues regarding the use of biological prostheses in contaminated wounds. The traditional approach in the repair of ventral hernias with contaminated wound is repaired in two stages. Solving the infection and then repair the hernia with synthetic material.\(2) In 2013, K.C. Hart et al, raised surveys to assess whether there is a consensus on the use of biological mesh in contaminated wounds. They found that 64% of respondents would venture to use a biological prosthesis in a contaminated wound.\(2) Proving that the investigation line is open to new data. The absolute contraindication to use prosthetic material in contaminated wounds may underestimate the use of them, or their use may be poorly supported. Until 2013 four clinical review and one systematic review, studied biological meshes and contaminated wounds were reported. The four Grey et al \(3) reviews Bachman et al \(4) Breuning et al \(5) and Sahnkaran et al \(6) recommend the use of biological meshes especially in contaminated wounds. In all revisions main complication was SSI represents from 0-60% of complications in all revisions. On the other hand Primus et al reviewed these studies finding multiple reasons why its findings may overestimate the use of them. Argues that this studies are case series or case reports that have low level of evidence. Also, how the information reported is inconsistent, no standardized studies were used in the review. It argues that it is impossible to compare those studies and draw conclusions. He even found that not all the classification used Disease Control

and Prevention \(CDC) to unify the definition of contaminated wound.1 Darehzereshki in 2014, made a meta-analysis reviewing literature from 1990 to 2012 finding that the biological material has fewer SSIs with high statistical value. 10 Concludes that biological mesh should be used whenever it is against indicated synthetic mesh. 10 There are multiple series of cases that have placed polypropylene mesh in contaminated wounds. For example Kelly and Behrman in 2002 reported their experience in 24 cases of inguinal hernias and parastomal hernia clean-contaminated or contaminated wounds, repaired with polypropylene meshes. Reporting wound morbidity in a follow up of 18% from in 6 months to 3 years. 11.12 Geisler et al. repaired 30 parastomal elective hernias placing the mesh onlay or sublay, found morbidity of 7% with one case that required mesh removal. 13 Suggesting the relative safe use of polypropylene meshes in contaminated wounds. Problem Statement: There is no consensus on the use of synthetic mesh in contaminated wounds. The last existing evidence overestimates use them. Is necessary to define whether they are safe in this type of injury. The reviewed studies are not comparable because the difference between integrated variables. The sample size and the conditions of each case are very different, and no meta-analysis is available. We propose an animal model to determine objectively whether they represent a risk for surgical site infection \(SSI). Objectives: To propose an animal model to study polypropylene meshes in infected wounds with E. coli.

Reagents

• Ketamine • Acepromazine • Lidocaine • Diclofenac • Acetaminophen • Gentamicin

Equipment

• Polypropyleno USP 3-0 • Polypropylene mesh 15x15 • # 15 scalpel blades. • Lighting lamps. • Surgical instruments. o Scalpel handle o Mayo Scissors straight o Metzenbaum scissors o Dissection with teeth and toothless o Tweezers E. Kelly x5 o Allys pliers 5 F. • G. straight Mosco 5 • H. curved Mosco 5 • Porta needles • Farabeuf Separator

Procedure

Procedures: This protocol is designed following the lineaments of NOM- 062- ZOO- 199 and the International Council for Laboratory Animals \(ICLAS). And following health standards for disposal of biological products. According to the Animal Protection Act of laboratories D.F. 2002 Legislature IV section XII, and the consensus of Helsinki 1995. Preoperative care: Preoperative fasting for 8 hours. Transoperative : Anesthesia: intramuscular dose ketamine 10mg / kg + Acetopromacina 1 mg / kg . He is to infiltrate the wound with lidocaine 20 mg / ml total dose of 3 ml . Procedure: With the subject lying prone, proceed to place an IV in the ear vein of the left ear. Anesthesia is induced the latency time is respected. It is placed in the supine position and then proceeds to trichotomy of the abdomen of the subject. Place supine on the operating table. Subsequently antisepsis with iodine is performed in the abdominal region. Twenty seconds later place sterile fields in surgical area. Anesthesia is tested corroborating that subject doesn’t deserves an extra dose of anesthetic. Proceed to make an incision in

mid line of approximately 6 cm skin and subcutaneous tissue. \(Figure 1 and 3). Dissect an area approximately of 5x6 cm subsequently to leave room for the prosthetic material. Proceed to measure the polypropylene mesh 5x4.8 cm in length. \(Figure2.) The surgical site is inoculated with E. coli inoculate \(previously prepared) in order to infest the wound solution. Wait for 3 minutes. \(Figure.5.) Proceed to place the polypropylene supraponeurotic mesh \(Figure6.). Place simple points to the aponeurosis with 2-0 polypropylene USP, four cardinal points in order to maintain in place de polypropylene mesh. \(Figure 7). Later close the skin with simple suture with Prolene 3-0 USP. \(Figure 8). Finally place an Elizabethan collar. Postoperative care: Monitor for complications such as; Seroma, abscess, dehiscence, sepsis and even death. All subjects will undergo autopsies. Cultivation of surgical site in two weeks \(positive cultures when > 100x106 UFC). Document daily with analysis sheets that includes all the variables and photographs. Every 24 hours the wounds are reviewed for indicators of SSI. Culture must be taken in function fo the degree of infection.

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Figures

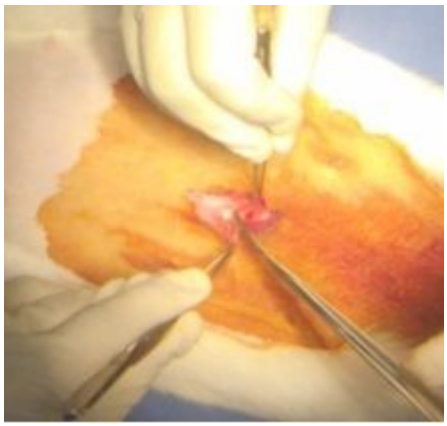

Figure 1

Image 1 Incision & Dissection. Dissect an area approximately of 5x6 cm subsequently to leave room for the prosthetic material.

Figure 2

Image 2 Polypropylene mesh Proceed to measure the polypropylene mesh 5x4.8 cm in length.

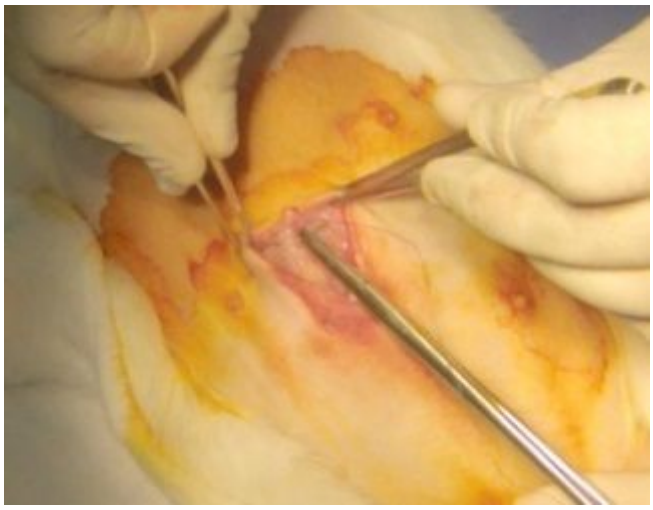

Figure 3

Image 3 Mesh in position 6 Cardinal Points Place simple points to the aponeurosis with 2-0 polypropylene USP, four cardinal points in order to maintain in place de polypropylene mesh.

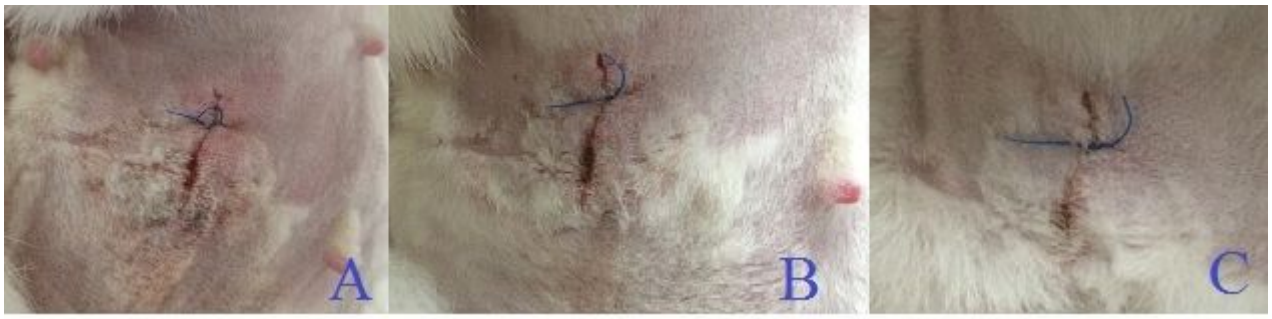

Figure 4

Image 4 Follow up. Monitor for complications such as; Seroma, abscess, dehiscence, sepsis and even death. All subjects will undergo autopsies. Cultivation of surgical site in two weeks (positive cultures when > 100x106 UFC).