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Opinion Article

Advancements in Bio Absorbable Sutures for Wound Healing

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DESCRIPTION

Bio absorbable sutures, also known as absorbable or dissolvable sutures, have revolutionized wound closure techniques in modern surgery. It is not necessary to remove these sutures because they are made to break down and be absorbed by the body naturally over time. Over the past few decades, advancements in materials, manufacturing processes and clinical applications have made bio absorbable sutures a foundation in both routine and complex surgical procedures. Their ability to promote healing while minimizing complications such as infection, scarring and discomfort has made them indispensable in contemporary surgical practices. Historically, bio absorbable sutures were primarily made from natural materials like catgut, derived from the intestines of sheep or cows. However, natural sutures were prone to unpredictable absorption rates and caused allergic reactions in some patients. With advancements in biomaterials science, synthetic bio absorbable sutures have largely replaced natural alternatives. These synthetic sutures often composed of Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA) or Poly Dioxanone (PDO), offer more predictable absorption times and enhanced biocompatibility. One of the most significant innovations is the development of multicomponent sutures, combining various polymers to create products with customized absorption profiles. These materials are designed to provide optimal tensile strength during the critical healing phase and then gradually degrade as the wound heals. For example, PDO sutures maintain strength for several weeks and then break down after about six months, which is ideal for deep internal wounds that require extended support. The shift to synthetic materials has significantly improved the biocompatibility of bio absorbable sutures. The absorption process of these sutures occurs through hydrolysis, where the suture material is broken down by water molecules, reducing the likelihood of foreign body reactions and minimizing inflammation. In the past, the degradation of natural sutures often caused inflammatory responses due to their unpredictable breakdown. Newer bio absorbable sutures have been engineered to minimize these inflammatory reactions, improving tissue healing. Polymers like Poly Glycolide (PGA) are designed to degrade more evenly, while materials such as PLLA (poly-L-Lactic Acid) offer a slower and more controlled absorption, ensuring that sutures provide support throughout the entire wound healing process without causing excessive scarring or irritation. The coating of bio absorbable sutures has also evolved, with advancements aimed at improving their performance. Some sutures are now coated with antimicrobial agents to reduce the risk of infection, which is one of the most common complications in surgery. For example, coatings with triclosan or silver ions have been shown to inhibit bacterial growth on the suture surface, improving patient outcomes and reducing the need for additional antibiotics. Moreover, the development of bioactive coatings that promote healing has shown potential. These coatings contain growth factors or peptides that stimulate tissue regeneration, further improving the wound healing process. By accelerating tissue recovery and improving collagen formation, these advanced sutures contribute not only to wound closure but also to faster and more effective healing. The ability to tailor absorption rates for different surgical applications is one of the most notable advancements in bio absorbable suture technology.

CONCLUSION

The clinical advantages of bio absorbable sutures are substantial. First, their ability to degrade without requiring removal reduces the risk of infection and scarring that can occur during suture removal, particularly in pediatric or elderly patients or those with limited mobility. Furthermore, patients experience less discomfort post-surgery, as there is no need for follow-up appointments to remove sutures, making recovery less invasive. Conversely, in soft tissue surgeries like those in the skin or subcutaneous layers, faster-absorbing sutures may be preferred to minimize the risk of long-term foreign body reactions. For example, in gastrointestinal surgeries, where tissues may heal at different rates depending on the location, sutures with slower degradation rates can be used to provide sustained support, preventing wound dehiscence.

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