

BARBED MESH FOR FAST, SUTURE-LESS SURGICAL WOUND CLOSURE

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Technology Description:

A surgeon at Washington University in St. Louis has designed a barbed mesh wound closure device with the potential to save time and improve outcomes by eliminating the need for surgical suturing to close incisions of the skin and fascia. This device has applications in a variety of surgical settings such as hernia repair, laparotomy incision closure, midline sternal incisions or cosmetic/plastic surgery.

Currently, suturing is a tedious, time-consuming process that depends on the skill of the individual surgeon and is prone to failure. Conventional surgical mesh can prevent suture failure (e.g., “cheesewiring” and hernia formation) by distributing the tension over a broad area. However, these products still require sutures to affix them to the tissue, extending the time needed to close incisions during surgery. This invention solves that problem by embedding the mesh with self-fixating barbs that penetrate the tissue and adhere it to the mesh without sutures. This could enable simple, one-handed application to quickly and simultaneously immobilize multiple layers of tissue in an approximated position. This would immediately stabilize the tissue by providing tensile strength to the closure without the wasted time and associated operating room cost of suturing.

Barbed Mesh Prototype



Stage of Research:

Currently, a prototype has been produced by stereolithography and demonstrated gross success in sutureless fixation of abdominal wall closure in a cadaveric porcine hernia model. Having established proof-of-concept, attention is now being turned towards design refinements and production methods.

Applications:

- **Surgical wound closure device** – suture-free surgical mesh with potential end-user applications such as:
 - abdominal hernia repair or prevention

- skin and soft tissue closure (e.g., laparotomy incision, midline sternal incision or an abdominoplasty incision)
- cosmetic/plastic surgery (e.g. abdominoplasty, obliteration of dead space in undermined tissue planes to eliminate the need for surgical drains)

Key Advantages:

- **Designed to save time and improve outcomes:**
 - fast, one-hand application - could reduce costly time in operating room
 - suture-less – barbs adhere mesh to tissue in a single-step to close an entire incision with no additional fixation
 - mesh provides tensile strength and flexibility – allows tissue ingrowth over a broad surface area to prevent “cheesewiring” seen with sutures
 - barbs can penetrate deeply – could simultaneously approximate multiple layers of tissue (e.g., dermis, subcutaneous fat, superficial fascia); barbs can also be bidirectional, to penetrate tissues both superficial and deep to the plane of the device.
- **Customizable** – modular design so mesh and barb features (e.g., material, strength, barb length) can be tailored to specific applications across many surgical disciplines

Patents: U.S. Application Pending

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