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MEDICINAL USES OF FIBRES

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Short Review

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ABSTRACT

Suture materials in orthopedic surgery are used for closure of wounds, repair of fascia, muscles, tendons, ligaments, joint capsules, and cerclage or tension band of certain fractures. The purpose of this study was to compare the biomechanical properties of eleven commonly used sutures in orthopedic surgery. Three types of braided non-absorbable and one type of braided absorbable suture material with different calibers (n=77) underwent biomechanical testing for maximum load to failure, strain, and stiffness. In all samples, the failure of the suture material occurred at the knot there was no slippage of the knot in any of the samples tested. This data will review the orthopedic surgeon in selection and application of appropriate suture materials and requires to specific tasks.

Key words: Fibre, Suture, Human Tissue, Synthetic, Bio-Degradable.

INTRODUCTION

Fiber is a natural or synthetic string or used as a component of composite materials, or, when matted into sheets, used to make products such as paper, papyrus, or felt. Fibers are often used in the manufacture of other materials. The strongest engineering materials often incorporate fibers, for example carbon fiber and ultra-high-molecular-weight polyethylene. Synthetic fibers can often be produced very cheaply and in large amounts compared to natural fibers, but for clothing natural fibers can give some benefits, such as comfort, over their synthetic counterparts.

Surgical complications associated with failure of tissue repair include wound dehiscence, re-rupture of muscle, tendon and ligaments, incisional hernia, failure of repair of capsulolabral structures, and loss of reduction of fractures.

TYPES OF FIBRES:

1. MAN MADE FIBRES
2. SYNTHETIC FIBRES
3. VEGETABLE FIBRES

1. MAN-MADE FIBRES can be divided in two main categories:

- Artificial fibres
- Synthetic fibres.

ARTIFICIAL FIBRES are derived from natural products (in most cases cellulose) that are modified by reactive agents.

Most known artificial fibres from cellulose: rayon or viscose;

- modal;
- lyocell;
- cuprammonium;
- acetate;

SYNTHETIC FIBERS

The principal synthetic fiber used for rope is nylon. It has a tensile strength nearly three times that of Manila. The advantage of using nylon rope is that it is waterproof and has the ability to stretch, absorb shocks, and resume normal length. It also resists abrasion, rot, decay, and fungus growth.

Most known synthetic fibres from chemical petrol products:

- acrylic;
- aramid (Kevlar and Nomex);
- vinyl chloride;
- modacrylic;
- polyamide (Nylon);
- polyester;
- polyethylene;
- polypropylene;
- polyurethane;
- polytetra fluoroethylene (Goretex).

VEGETABLE FIBERS

The principal vegetable fibers are abaca (known as Manila), sisalana and henequen (both known assisal), hemp, and sometimes coir, cotton, and jute.

APPLICATIONS OF FIBRES:

The suture has the following characteristics:

- Sterile
- All-purpose (composed of material that can be used in any surgical procedure)
- Causes minimal tissue injury or tissue reaction (ie, nonelectrolytic, noncapillary, nonallergenic, noncarcinogenic)
- Easy to handle
- Holds securely when knotted (ie, no fraying or cutting)
- High tensile strength
- Favorable absorption profile
- Resistant to infection

WHY IS FIBER IMPORTANT TO US?

Fiber is material from plant cells that cannot be broken down by enzymes in the human digestive tract. There are two important types of fiber: water-soluble and water insoluble. Each has different properties and characteristics.

- **Soluble:** Water-soluble fibers absorb water during digestion. They increase stool bulk and may decrease blood cholesterol levels. Soluble fiber can be found in fruits (such as apples, oranges and grapefruit), vegetables, legumes (such as dry beans, lentils and peas), barley, oats and oat bran.
- **Insoluble:** Water-insoluble fibers remain unchanged during digestion. They promote normal movement of intestinal contents. Insoluble fiber can be found in fruits with edible peel or seeds, vegetables, whole grain products (such as whole-wheat bread, pasta and crackers), bulgur wheat, stone ground corn meal, cereals, bran, rolled oats, buckwheat and brown rice.

Why is soluble fiber so important for our health?

Soluble fiber has been shown to reduce total blood cholesterol levels and may improve blood sugar levels in people with diabetes.

The best sources of soluble fiber are oats, dried beans and some fruits and vegetables. Although there is no dietary reference intake for insoluble or soluble fiber, many experts recommend a total dietary fiber intake of 25 to 30 grams per day with about *one-fourth — 6 to 8 grams per day* — coming from soluble fiber.

CONCLUSIONS:

The suturing technique is a complex operation involving a surgeon-specific mix of cognitive and technical Components. Notwithstanding the surgeon importance, the choice of the correct suture is fundamental for tissue healing and patient recovery. Usually, this choice takes into account the patient, the type of wound and tissue characteristics and also the anatomic region. An inelastic suture cannot be placed to the area where the tissues or incision subjected to stretch often.

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