

Plants Fibres Used As Surgical Dressings

Surgical dressing- The word surgical dressing is used to include all the materials either used alone or in combination to cover the wound.

The purpose of application of dressing is to protect the wound and favour its proper healing.

Dressings Are Meant For Following Functions.

- To reduce the microbial contacts and protect the infections.
- To provide the mechanical support and healing the tissue.

Classification Of Surgical Dressing

A- Fibres

1- Non medicated fibres.

Ex- absorbent cotton, wool, silk etc.

2- Medicated fibres.

Ex- Capsicum wool

B- Fabric

C- Bandages

D- Rubber and oil impregnated materials.

COTTON-

Synonyms- Cotton wool, surgical cotton, absorbent cotton, purified cotton.

Biological source- Cotton consists of the epidermal trichomes or hairs of the seed of cultivated plant *Gossypium herbaceum* and other *Gossypium* species.

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Family- Malvaceae

Geographical source- Cotton is produced commercially in U.S.A , Egypt, and India. It is also cultivated in various part of Africa and South America.

Cultivation and collection -

- The plant after flowering bears fruits known as capsule. The fruit are 3 to 5 celled and each capsule contain numerous seeds. The seed covered with hairs are known as bolls.
- The bolls are collected dried and taking to the ginning press, where in the trichomes are seperated from the seed and contains long and short hairs.
- Short length hairs are known as linters and are used in the manufacturing of absorbent cotton, and long hair are used in cloth preparation.

Chemical Constituents- Raw cotton contains about 90% of Cellulose 7 to 8 % of moisture, wax, fat and remains of protoplasm. Purified cotton is entirely cellulose, with 6 to 7 % of moisture.

Chemical Tests-

- A. Cotton is insoluble in dilute NaOH solution and HCl, it is soluble in 66% of H₂SO₄.
- B. With iodinated ZnCl solution, it becomes violet coloured.
- C. 0.1g of sample add 10ml of ZnCl solution and heat to 40°C fibres do not dissolve.

Uses/Applications

- Cotton is used as a filtering medium in surgical dressing.
- Absorbent cotton absorbs blood, mucus, pus, and prevent wounds from infections of microbes.
- It is also used as an insulating materials.

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SILK-

Synonyms - fabric, sarsenet, textile.

Biological source- These are the fibres obtained from the cocoons of *Bombyx mori* and other species of Bombox and also from Antheraea species.

Family- Bombycidae.

Order- Lepidoptera.

Geographical source- Fine quality of silk is manufactured in Japan, Italy, China, and France. Now a days large quantity of silk is also prepared in India.

Preparation Of Silk-

- The larva of silkworm produce silk fibroin fibres from the gland in their mouth
- This fibroin gets United with a gum like secretion known as sericin and forms cocoon.
- These cocoons are not allowed to grow further into an insect, but are heated to 60 - 80° C by exposing them to stem.
- The exposed cocoons are put into hot water to dissolve the gum and to seperate the fibres.

Chemical Constituents -

Silk contains a protein is known as fibroin. Fibroin on hydrolysis yields amino acids glycine and alanine.

Uses/Applications-

- It is soft smooth lustrous and holds a prestigious place among textile fibres and known as 'Queen of textile'.
- Raw silk is used for clothing such as shirts, suits, ties, blouses, pajamas etc.

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Storage Conditions- It needs to be stored in cool place. Exposure to light causes its darkening and bleaching reduces its tensile strength.

WOOL

Synonyms- fleece, coat, woollen hair.

Biological source- Wool fibres are obtained from the fleece of sheep *Ovis aries*.

Family- Bovodae

Order- Ungulata.

Geographical source- Large quantities of wool are manufactured in Australia, Russia, Argentina, USA and also in India.

Preparation of Wool Fibres-

The hairs forming the fleece of the sheep are removed at shearing time. They are then processed to remove the wool fat and dirt. The clean and defatted wool is subjected to bleaching, washed again and dried.

Chemical Constituents-

Chemically wool contains sulphur containing protein is known as keratin. Keratin is rich in amino acid cystine

Chemical Tests

Take 0.5g sample in chloroform and add 1ml acetic anhydride and 2 to 3 drops of sulphuric acid then deep green colour indicate the cholesterol presence.

Uses/Applications-

It is used as water absorbable ointment base. It is the common ingredients in the water soluble cream and cosmetics.

It is widely used in the winter clothes preparation like sweaters, winter coat, cap etc.

Regenerated Fibres-

Regenerated fibres are made from the cellulosic parts of the plants by dissolving in chemicals.

They are partially natural and partially synthetic, as a chemical is needed to extract these fibres.

Rayon

Synonyms- Regenerated cellulose, viscose rayon.

Source, Preparation And Chemical Constituents-

- It is an artificial fibre composed of regenerated cellulose in which substituents have replaced not more than 15% of hydrogen of hydroxyl groups. Now it is produced exclusively by the viscose process
- The cellulose of coniferous wood in the form of pulp is processed to give viscose rayon. The pulp contain about 80- 90 % of cellulose and hemicellulose. The cellulose is treated with sodium cellulosate. It is further treated with carbon disulphide and sodium hydroxide to produce viscous solution of sodium cellulose xanthate.
- After ripening, this solution is forced through the fines nozzles into the both of sodium sulphate and sulphuric acid to give continuous filaments. The filaments are drawn together to form the yarn.
- The yarn is desulphurized bleached, washed, twisted and then dried. Rayon contains about 10% moisture and does not loose the absorbency on storage like cotton.

Uses/Applications-

It is mainly used for making fabrics preparation of surgical dressing and viscose rayon absorbent wool.

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Sutures

These are the sterile threads, strings or strands specially prepared for use in surgery meant for sewing tissue together. SUTURES must possess the following properties.

- A. A-They must be sterile and should cause no irritation.
- B. B- They are intended to be used for one occasion only.
- C. C- If absorbable, their time of absorption must be known.

Preparation-

Sutures may be prepared from intestinal tissues and tendons of animals and birds, Vegetable fibres, camel hair, human hair, synthetic threads or metallic wires. Depending of absorption character it is divided into two parts-

- 1- Absorbable
- 2- Non absorbable
- 3- Haemostatics.

Surgical Catgut

Catgut is a type of string or cord that is prepared by the natural fibers, present in the cattle intestine. First time it is prepared by the sheep intestine fibres. It is also prepared by the many cattles intestine like goat, horses, donkey, etc.

Catgut sutures finally treated with the chromium salt solutions to resists body enzymes and slow down their absorption process, this sutures are widely used in surgical procedure and it is known as chromic catgut sutures.

Nowdays catgut are also prepared by synthetic absorbable polymers such as vicryl and polydioxanone.

Ideal Characteristics of Sutures-

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- Easily degraded by the proteolytic enzyme.
- Easily absorbable by the body.
- Do not cause any irritation and allergic reaction.
- Not shows any chemical reactions to the body chemicals.
- Maintain the tensile strength upto tissue healing.

Uses/Applications

- Catgut sutures are used in the surgical process at any accidental/trauma condition for blocking the excessive bleeding.
- Also used in other surgical process like- tissue replacement, during delivery of baby, Cancer surgery, for wound healing.

LIGATURES

Ligatures are specially prepared and sterilized threads which is used without a needle for tie the blood vessels and other tissue together.

Stainless steel ligatures- these are used for the tooth aligning and leveling.