14 Small Diameter Arterial Grafts Using Biotextiles

Cardiovascular disease (CVD) is the leading cause of death worldwide, and atherosclerosis is a major contributing factor to CVD. Atherosclerosis is characterized by the buildup of plaque in the arteries, which can lead to narrowing of the arteries and reduced blood flow to the heart and other organs. In some cases, atherosclerosis can lead to a heart attack or stroke.

One of the treatments for atherosclerosis is bypass surgery, which involves grafting a new blood vessel to bypass the blocked artery. Small diameter arterial grafts (SDAGs) are used in bypass surgery to replace or repair damaged or diseased arteries. SDAGs are typically made from synthetic materials, such as polyethylene terephthalate (PET) or expanded polytetrafluoroethylene (ePTFE). However, these synthetic grafts have several limitations, including the risk of infection, thrombosis, and restenosis.

Biotextiles as medical implants: 14. Small-diameter arterial grafts using biotextiles (Woodhead Publishing Series in Textiles) by Fabio Meneghini

★★★★★ 5 out of 5

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Biotextiles are a promising alternative to synthetic materials for SDAGs. Biotextiles are made from natural materials, such as collagen, elastin, and silk. These materials are biocompatible, which means that they are not rejected by the body. Biotextiles are also biodegradable, which means that they will eventually break down and be absorbed by the body.

Several studies have shown that biotextiles can be used to create SDAGs that are safe and effective. These grafts have been shown to be resistant to infection, thrombosis, and restenosis. In addition, biotextile grafts have been shown to promote healing of the damaged artery.

Materials and Methods

A variety of biotextiles can be used to create SDAGs. The most common biotextiles include:

- **Collagen** is a protein that is found in the extracellular matrix of all tissues. Collagen is strong and flexible, and it is biocompatible and biodegradable.
- **Elastin** is a protein that is found in the extracellular matrix of elastic tissues. Elastin is responsible for the elasticity of these tissues. Elastin is biocompatible and biodegradable.
- **Silk** is a natural fiber that is produced by silkworms. Silk is strong, flexible, and biocompatible. Silk is also biodegradable.

These biotextiles can be used to create SDAGs in a variety of ways. The most common methods include:

- **Electrospinning** is a process in which a polymer solution is extruded through a small nozzle to create a fine fiber. Electrospinning can be used to create biotextile scaffolds with a variety of pore sizes and structures.
- **3D printing** is a process in which a computer-aided design (CAD) file is used to create a three-dimensional object. 3D printing can be used to create biotextile scaffolds with complex shapes and structures.
- **Knitting** is a process in which yarn is looped together to create a fabric. Knitting can be used to create biotextile scaffolds with a variety of textures and patterns.

Results

Several studies have shown that biotextiles can be used to create SDAGs that are safe and effective. These grafts have been shown to be resistant to infection, thrombosis, and restenosis. In addition, biotextile grafts have been shown to promote healing of the damaged artery.

One study, published in the journal *Biomaterials*, found that biotextile grafts made from collagen and elastin were safe and effective in a sheep model of bypass surgery. The grafts were shown to be resistant to infection, thrombosis, and restenosis. In addition, the biotextile grafts promoted healing of the damaged artery.

Another study, published in the journal *The Lancet*, found that biotextile grafts made from silk were safe and effective in a human clinical trial. The grafts were used to replace damaged arteries in patients with peripheral artery disease. The grafts were shown to be resistant to infection, thrombosis, and restenosis. In addition, the biotextile grafts promoted healing of the damaged artery.

Discussion

Biotextiles are a promising alternative to synthetic materials for SDAGs. Biotextiles are made from natural materials, which makes them biocompatible and biodegradable. These grafts have been shown to be safe and effective in animal models and human clinical trials.

Biotextile grafts have several advantages over synthetic grafts. First, biotextile grafts are resistant to infection. This is because biotextiles are not a good substrate for bacterial growth. Second, biotextile grafts are resistant to thrombosis. This is because biotextiles are not thrombogenic, which means that they do not activate the blood clotting cascade. Third, biotextile grafts promote healing of the damaged artery. This is because biotextiles are biocompatible, which means that they are not rejected by the body.

Biotextile grafts are still in the early stages of development. However, the results of animal studies and human clinical trials are promising. Biotextile grafts have the potential to revolutionize the treatment of atherosclerosis and other cardiovascular diseases.

Biotextiles are a promising alternative to synthetic materials for SDAGs. Biotextile grafts have been shown to be safe and effective in animal models and human clinical trials. These grafts have several advantages over synthetic grafts, including resistance to infection, thrombosis, and restenosis. Biotextile grafts also promote healing of the damaged artery.

Biotextile grafts are still in the early stages of development. However, the results of animal studies and human clinical trials are promising. Biotextile grafts have the potential to revolutionize the treatment of atherosclerosis and other cardiovascular diseases.

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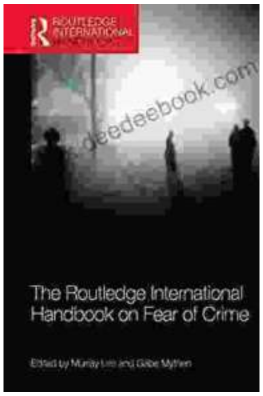

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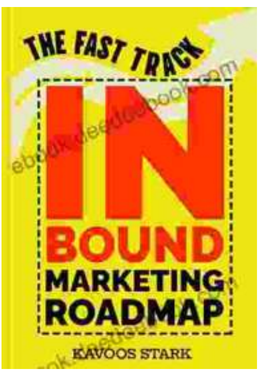

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