

Gore-Tex Laryngoplasty

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Gore-Tex는 expanded Polytetrafluoroethylene의 상품명으로 ePTFE라고도 한다.

Gore-Tex는 1960년대에 개발되었고 Gore-Tex is a registered trademark of W.L. Gore & Associates로서 water-proof/breathable fabrics로 더욱 유명하다.

Gore-Tex was co-invented by Wilbert L. Gore(1912~1986) and his son, Robert W. Gore. US Patent 3,953,566 on April 27, 1976, for a tetrafluoroethylene polymer in a porous form which has a microstructure characterized by nodes interconnected by fibrils.

US Patent 4,194,041 on 18 March 1980 for a waterproof laminate Gore-Tex materials are typically based on thermomechanically expanded polytetrafluoroethylene PTFE and other Fluoropolymer products.

They are used in a wide variety of applications such as high performance fabrics, medical implants, filter media, insulation for wires and cables, gaskets and sealants.

의학적 관점에서 보면

The same kind of material we find in our ski and camping outfits

Generic name "expanded-polytetrafluoroethylene"(e-PTFE for short).

Polytetrafluoroethylene is commonly known as Teflon.

Because it is "expanded", it has a microporosity (little tiny pores throughout the material) that is large enough to allow for tissue ingrowth without forming typical scar tissue encapsulation.

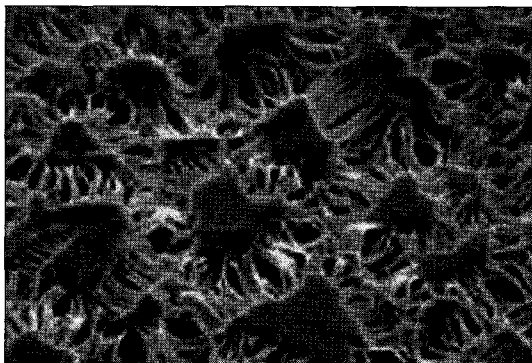
This allows for the implant material to become incorporated with the body in a much more natural way.

The material is a permanent implant material, in other words, it does not degrade or change its form after implantation.

This is very important. If for whatever reason it is necessary to remove the material, it can be completely removed.

수술과 관련해서는 1970년대부터 혈관수술에 이용을 하기 시작하였고 생체내에서 커다란 부작용이 보고되지를 않아서 점점 널리 사용되기 시작하였다.

동물실험이나 인체 내에서도 Gore-Tex는 별다른 생체내 변화를 유발시키거나 유착 등이 많지 않아서 수술 재료로 각광을 받고 있고 성형수술의 재료로 널리 사용되기 시작하였다.



Gore-Tex membrane, electron microphotograph(micropore가 많다)

- 1) Reticulated structure
- 2) Microporous structure, which fascilate host tissue ingrowth

이비인후과의 관점에서 본다면

성대마비의 경우는 다음과 같은 수술적인 치료법이 있고 이는 각각 특성이 있다.

Injection laryngoplasty, Medialization thyroplasty, Arytenoid

adduction, Cricothyroid subluxation 등의 방법이 소개되어 있으나 엄밀한 비교가 불가능하여 가장 좋은 방법을 찾기는 쉽지 않은 편이다. 술자의 입장에서 본다면 technical simplicity가 중요하다. 그 이유는 수술 시간 단축되면 성대에 부종이 덜 생겨 결과도 좋아지는 것이다.

그런 의미에서 Gore-Tex를 이용한 기술을 선호하는 사람도 있다.

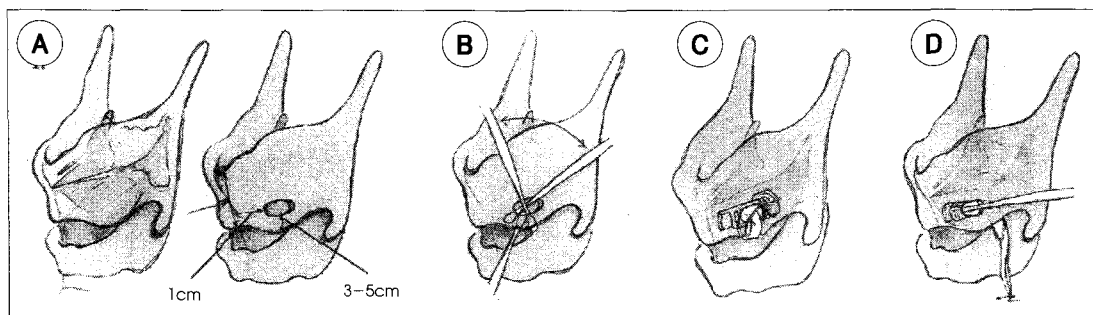
ePTFE의 장점은 다음과 같다.

- 1) Biocompatibility
- 2) Low extrusion rate
- 3) Ability of easy removal
- 4) Well known to surgeons

Surgical Methods

(McCulloch TM, Hoffman HT. Medialization laryngoplasty with expanded polytetrafluoroethylene. *Ann Otol Rhinol Laryngol* 1998;107:427-432)

- 1) Local anesthesia
- 2) IV sedation
- 3) Dexamethasone, preoperatively
- 4) 1% lidocaine with 1 : 100000 epinephrine-5-15ml-skn and deeper structure
- 5) Intermittent examination of larynx during operations (nasal decongestion)
- 6) Horizontal incision
- 7) Subplatysmal flap
- 8) Separate strap muscle with perichondrium
- 9) Lat half of laryngeal cartilage-exposing (accurate positioning of the windows)
- 10) Windows : 3-5mm above the lower border and 1cm posterior to the midline
- 11) Size of the windows : 6 by 10mm
- 12) ePTFE cardiac patch (5×7.5×0.6cm)-single 6~7mm wide ribbon soaked with antibiotics
- 13) Visual feedback and audio feedback to check the position of the implant
- 14) ePTFE material is passed under the inferior strut
- 15) ePTFE is wrapped around the inferior strut for stabilization
- 16) Remaining portion of ribbon is judiciously positioned thru the window
- 17) 4-0 nylon or prolene suture thru ePTFE and circumferentially around the inferior strut
- 18) Additional suture placed superiorly thru the upper half of the cartilage
- 19) For best long-term result, slight amount of acute overcorrection (pressed voice) is advised
- 20) Final endoscopic examination
- 21) Wound irrigation
- 22) Postop steroids



Medialization laryngoplasty with expanded polytetrafluoroethylene (Surgical technique and preliminary results)

Gore-Tex를 이용한 시술의 장점

- 1) No special instruments
- 2) Precisions not required
- 3) Medialization done in an incremental fashion—readily reversible
- 4) ePTFE is secured by sutures
- 5) Revision procedures ready
- 6) Combined w or w/o arytenoid adduction

Complication

(*Otolaryngol Head Neck Surg* 2004 Sep;31 (3):236-240)

156 patients that underwent GML

Sixteen patients required 22 revision procedures.
complications and glottal closure problems.

Complications included EXTRUDED OR DISPLACED IMPLANTS (n=4).

The most common GLOTTAL-CLOSURE PROBLEM

Undercorrection (n=9).
Overcorrection (n=1)
Persistent posterior glottal gap (n=2).

Revision procedures included

GML (n=9)
Injection augmentation (n=9)
Endoscopic implant removal (n=2), and arytenoid adduction (n=2)

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