

Customised sutures in Cardiac- / Paediatric cardiac surgery



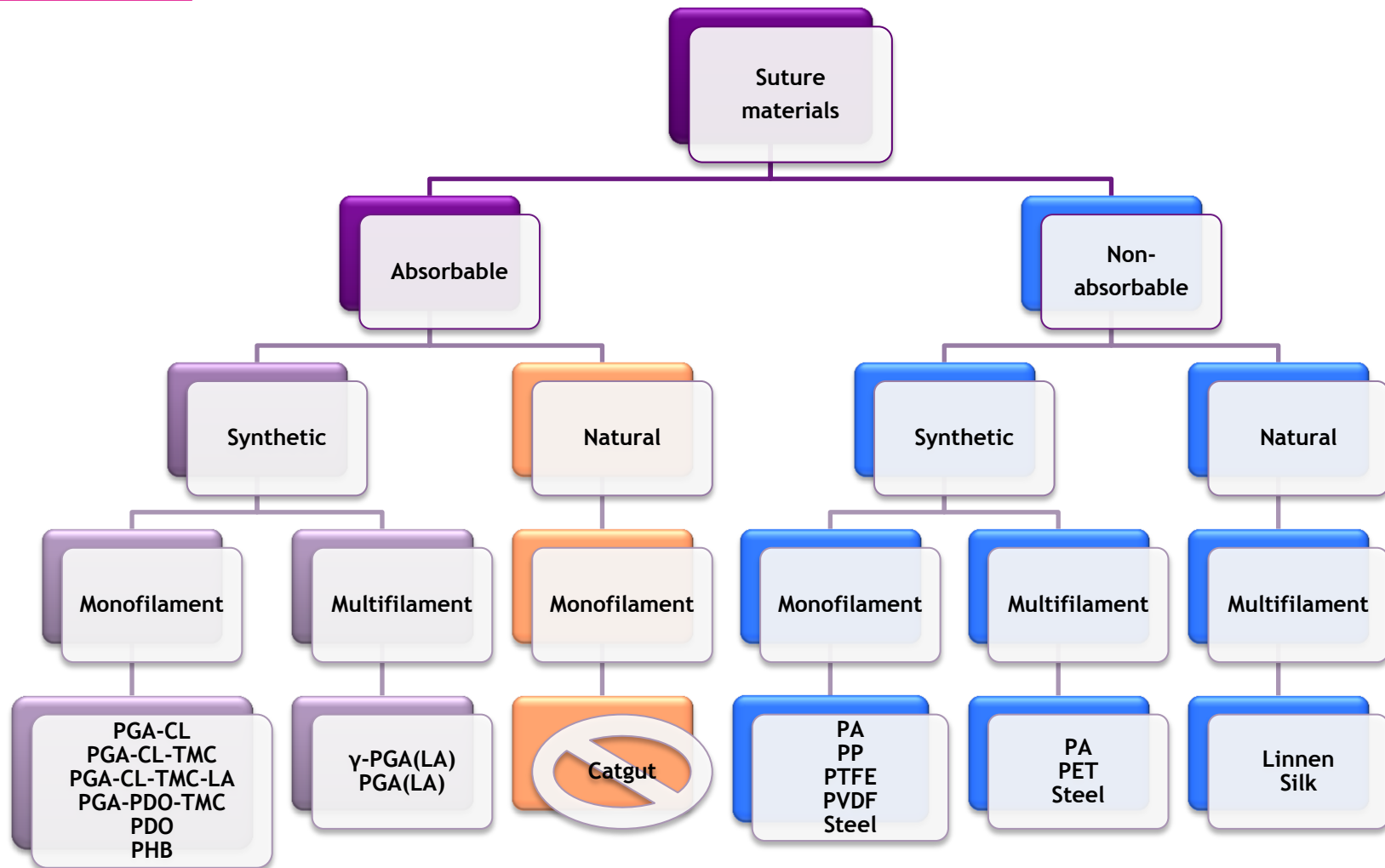
Cardiac surgery



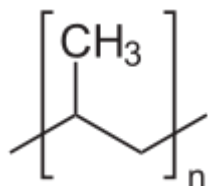
Cardiac- / Paediatric cardiac surgery

1. Some basics
2. Heart valve surgery
3. Heart valve repair / Chordae loops
4. Tissue enforcement / Pledgets
5. Paediatric heart surgery
6. Coronary bypass surgery
7. Customisation

Classification criteria



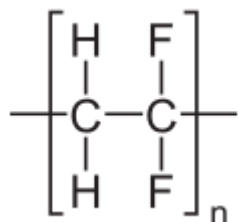
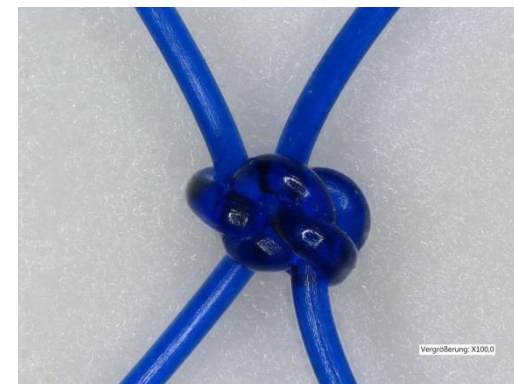
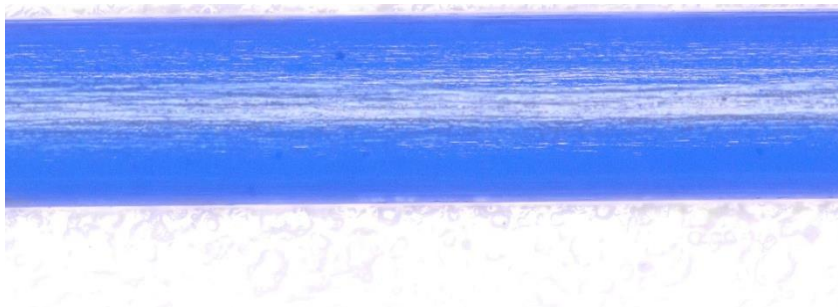
Suture – Polypropylene (PP) - SERAPREN



Standard vascular suture
Non absorbable
Permanently stable
Low tissue reaction
High knot tensile strength
Quite stiff

Knot forming acceptable
Knot security acceptable
Monofilament
Tissue drag OK

Suture – Polyvinylidenfluoride (PVDF) - SERALENE



Vascular suture

Non absorbable

Inert

Very low tissue reaction

High knot-pull tensile strength

Smoother than PP

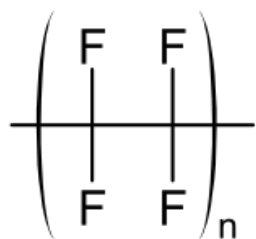
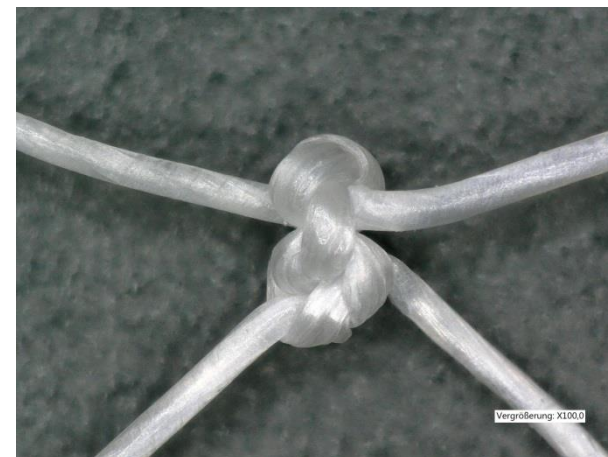
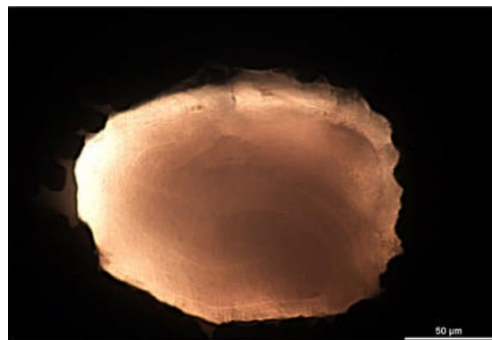
Knot forming better than PP

Knot security acceptable

Monofilament

Tissue drag OK

Suture – Polytetrafluorethylene (PTFE) - SERAMON



Vascular suture

Non absorbable

Inert

Very low tissue reaction

Highest knot-pull tensile strength

Extremely smooth

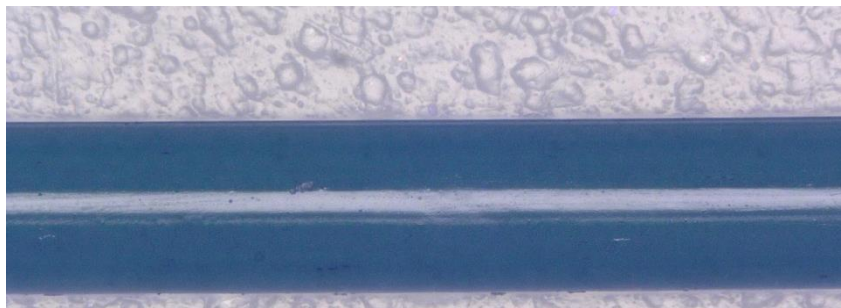
Knot forming good

Knot security low

Monofilament

Tissue drag excellent

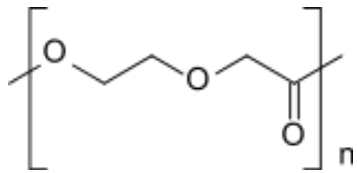
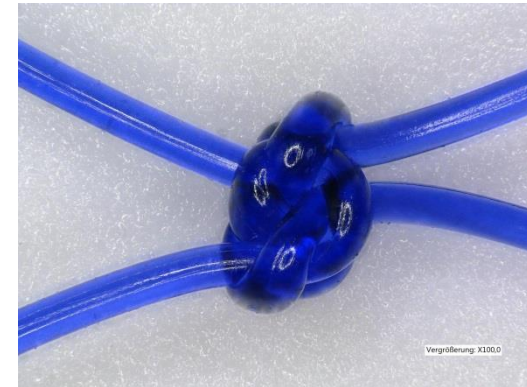
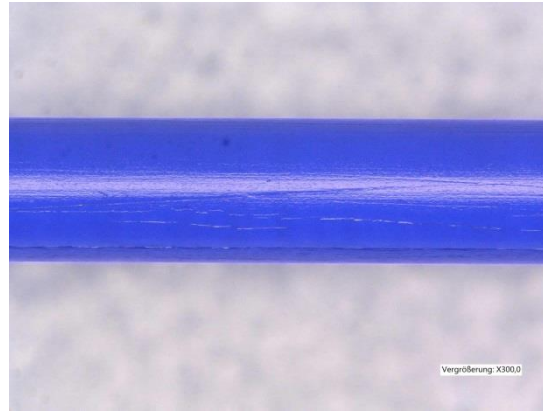
Suture – Polyamide (PA)



Standard suture skinclosure
Non absorbable
Fragmentation after years
Low tissue reaction
High knot-pull tensile strength
Smooth

Knot forming good
Knot security good
Monofilament
Tissue drag good

Suture – Polydioxanone (PDO) - SERASYNTH



Vascular suture

Absorbable

Acceptable tissue reaction

High knot-pull tensile strength

Quite stiff

Knot forming good

Knot security acceptable

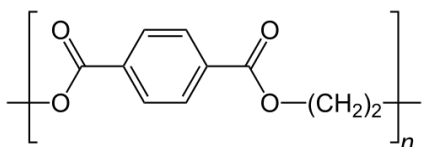
Monofilament

Tissue drag OK

Absorption time - comparision

Material	Halbwertszeit [d]	Auflösezeit [d]
γ -PGA(-LA)	ca. 5 - 7	ca. 35 - 42
PGA-CL-TMC-LA	ca. 5	ca. 60
PGA-CL-TMC	ca. 6 - 7	ca. 56
PGA-CL	ca. 8 - 13	ca. 90 - 120
PGA-CL-TMC	ca. 14	ca. 60 - 90
PGA	ca. 17 - 21	ca. 90 - 100
PGA(-LA)	ca. 15 - 21	ca. 56 - 70
PGA-PDO-TMC	ca. 20	ca. 90 - 110
PDO	ca. 28 - 42	ca. 180 - 210
PCL	ca. 42 - 49	ca. 175
PHB	ca. 100	ca. 450

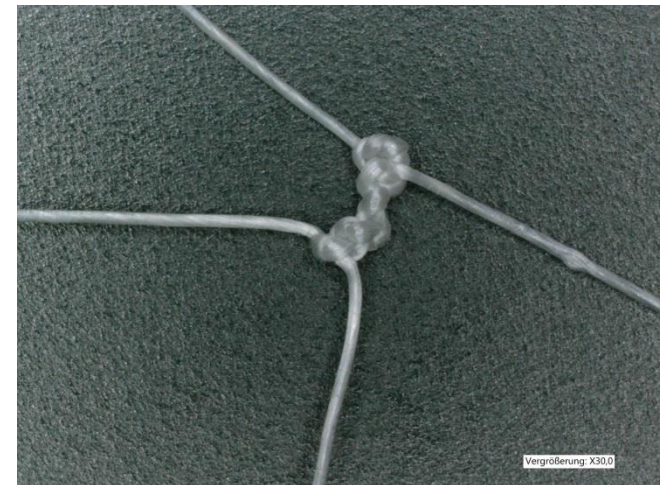
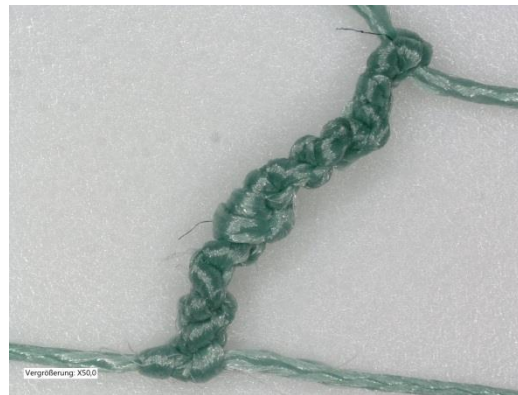
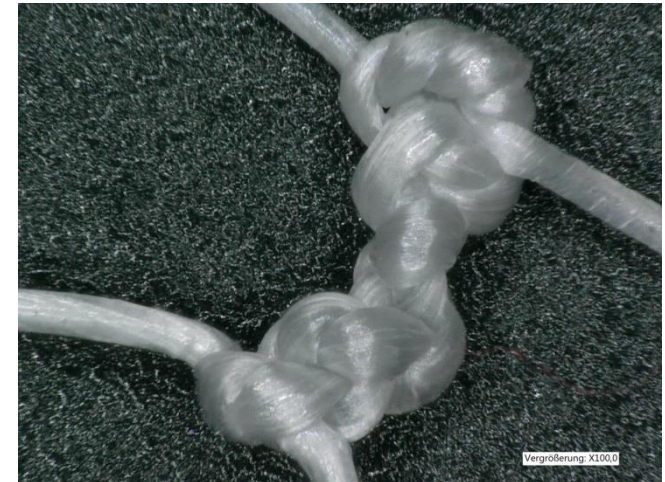
Suture – Polyethylene terephthalate (PET) SERACOR



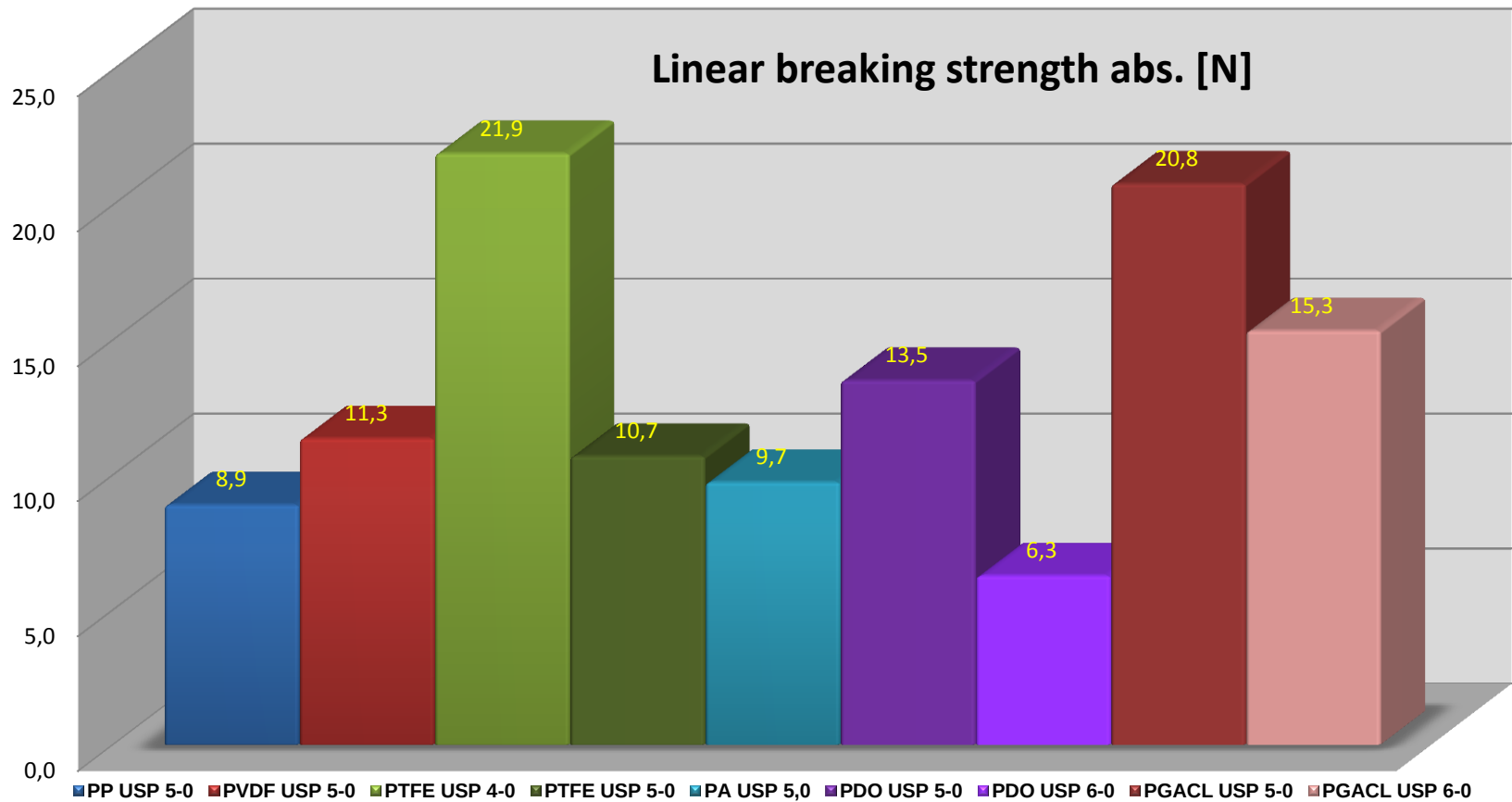
Standard valve suture
Non absorbable
Permanently stable
Low tissue reaction
High knot-pull tensile strength
Quite smooth

Knot forming very good
Knot security good
Multifilament
Tissue drag acceptable
Low capillarity

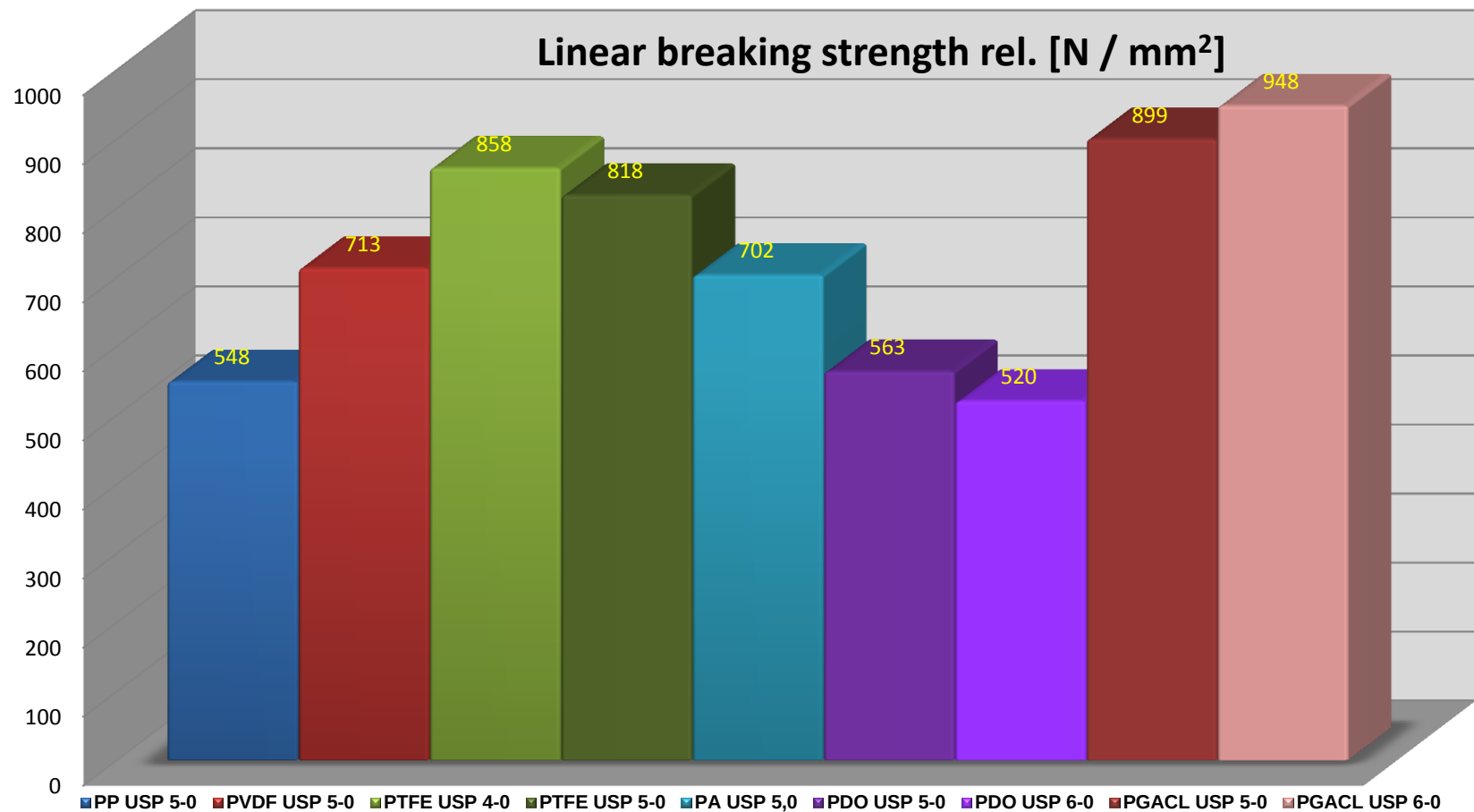
Suture – Knot security



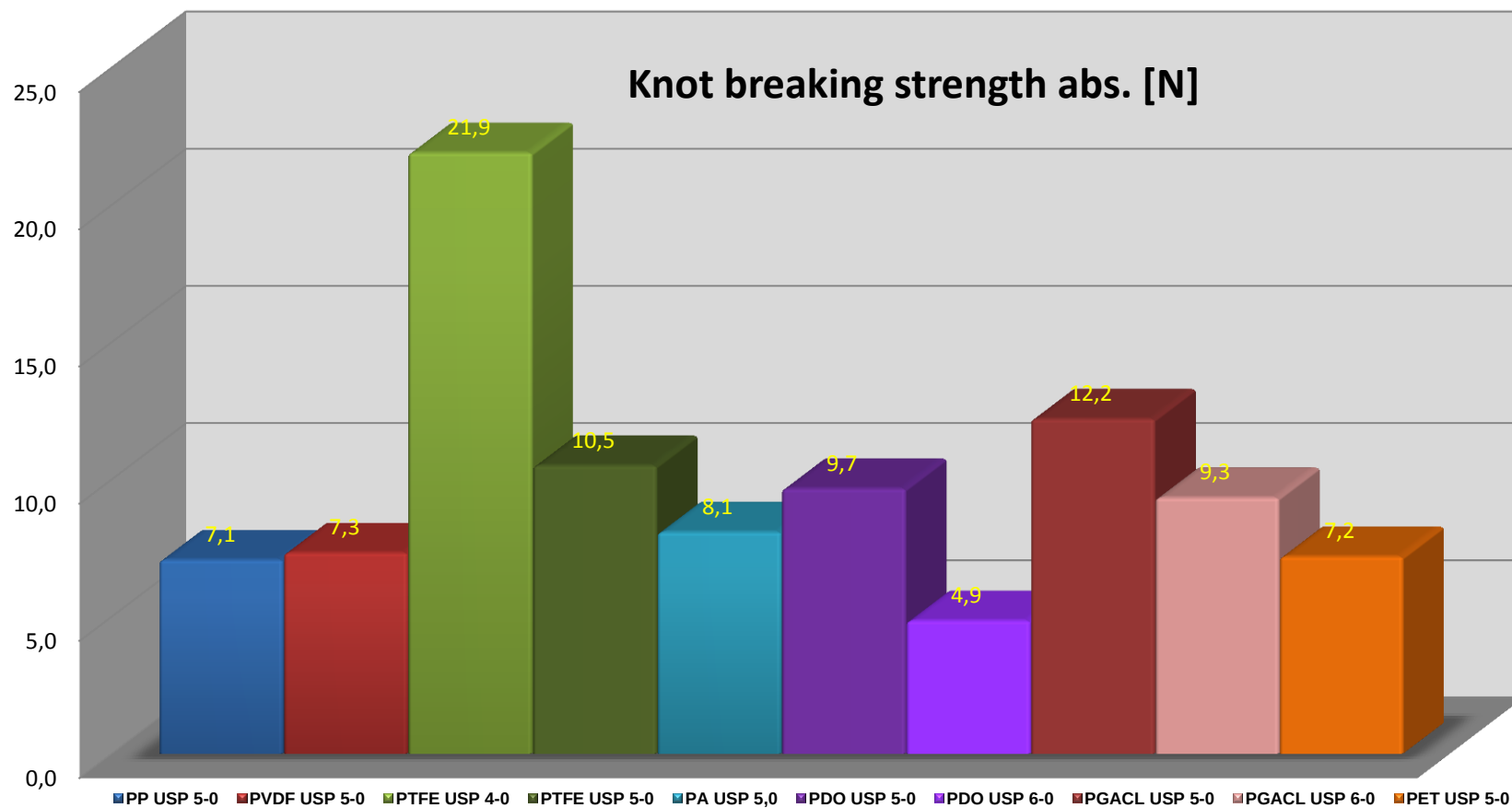
Suture –Breaking strength I



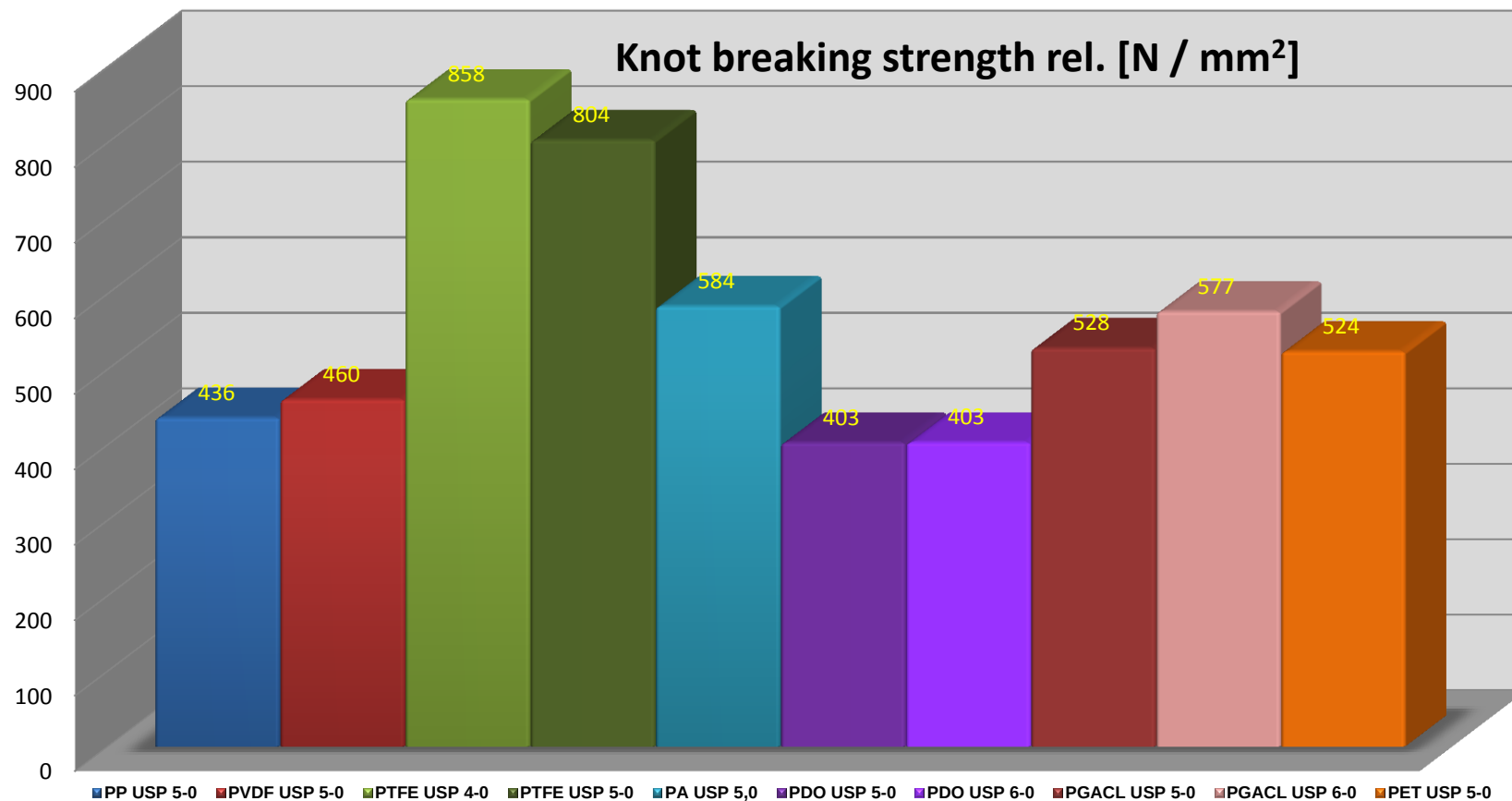
Suture – Breaking strength II



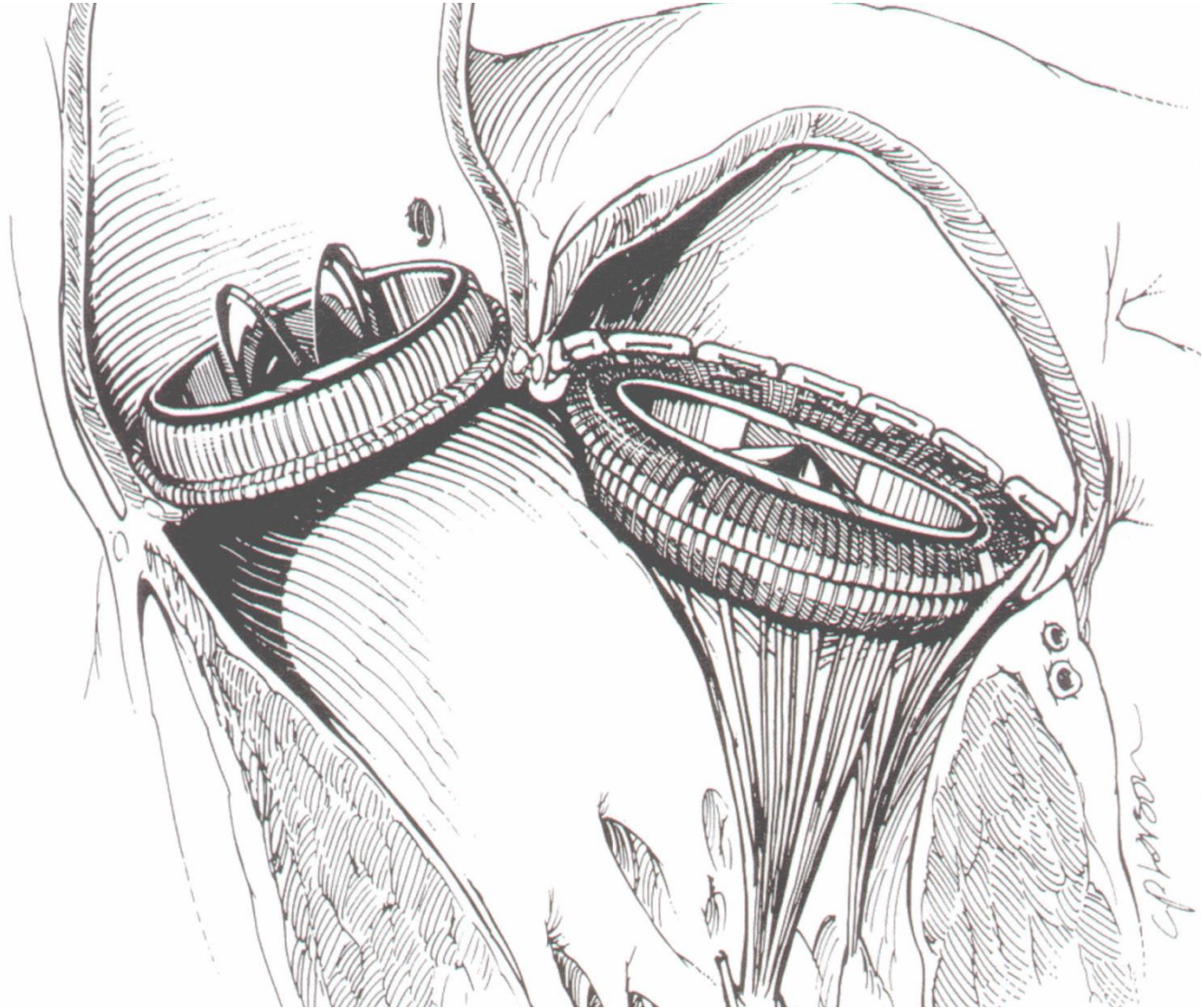
Suture – Breaking strength III



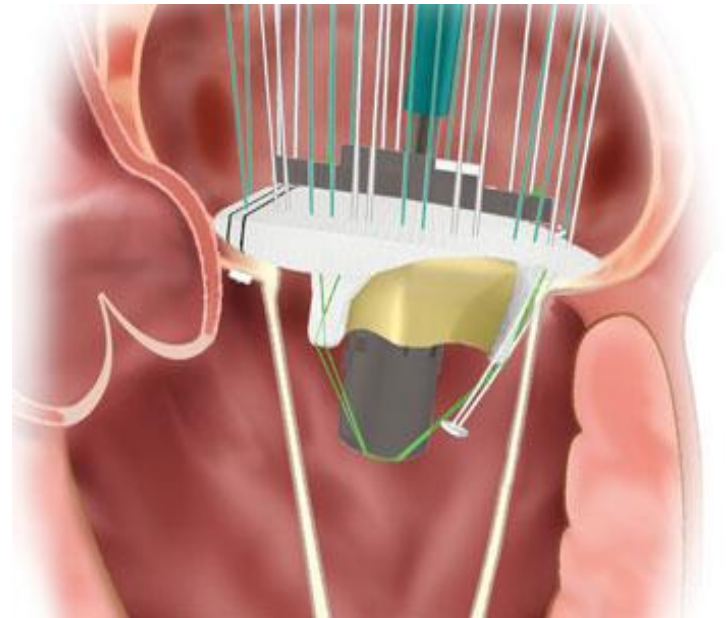
Suture – Breaking strength IV



Heart valve surgery



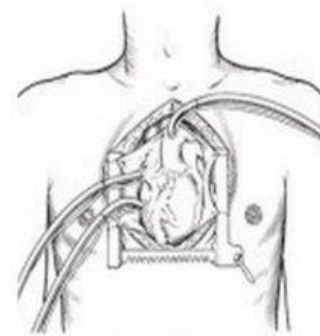
Heart valve surgery



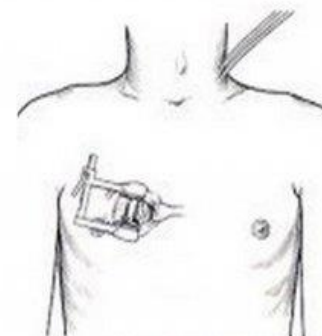
green and white sutures are used for an easier identification

Heart valve surgery

- **Minimally-invasive valve surgery**
- Heart surgeons can access the heart through a small incision between the ribs.
- Valves can be repaired via special elongated instruments and viewing scopes.
- Benefits may include e.g.
 - Shorter recovery time and faster return to normal activities
 - Shorter hospital stay (average 3-5 days)
 - Lower risk of infection
 - Reduced trauma and pain
 - Smaller scars



Traditional Open
Heart Surgery



Minimally Invasive
Heart Surgery

Heart valve surgery

- high knot-pull tensile strength
- good knot gliding capabilities
- no loss of knot holding security
- no change of original physical properties
- pledgets shall avoid tissue damage

Heart valve surgery - SERACOR

- multifilament, specially coated polyester competitor material Ethibond, Ticon
 - highly compatible in tissue
 - high knot-pull tensile strength
 - remarkable pliability $\Rightarrow$ easier to knot
 - excellent knot holding properties
 - excellent knot run down properties
- $\rightarrow$ material fulfils all requirements



Heart valve surgery - SERACOR

- **User-friendly packaging**
- Transparent pack ensures easy identification of needles
- Needles in foam provides protections for the needle tip and sterile pack
- Special recesses for simple needle clamping

For easier and fast working
(very important for op-nurses!)

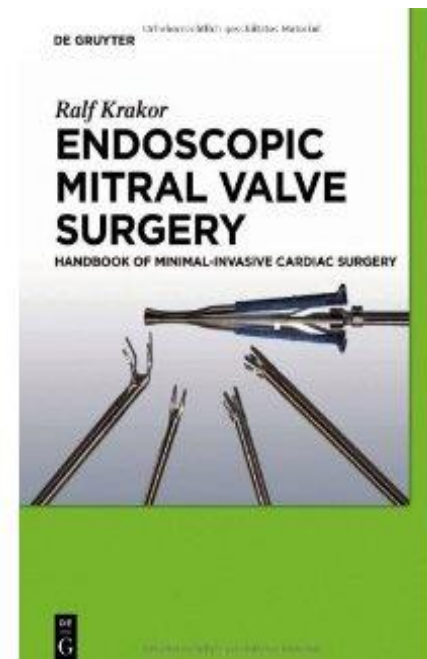


Heart valve surgery - SERACOR

Minimally-invasive mitral valve surgery

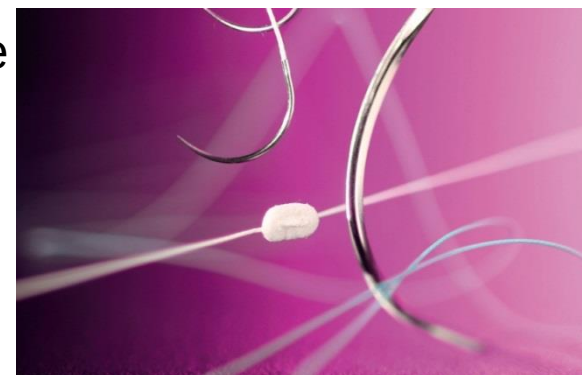
SERACOR is a very suitable suture due to their special product characteristics. Its superior handling was also mentioned in „Endoscopic Mitral Valve Surgery“:

„...More flexible rings need a more flexible und smooth material for a running suture.... knotting and good gliding features... from Serag-Wiessner, Germany...“

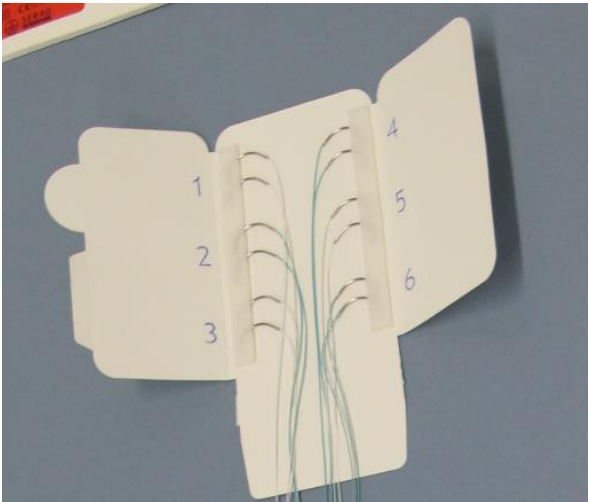
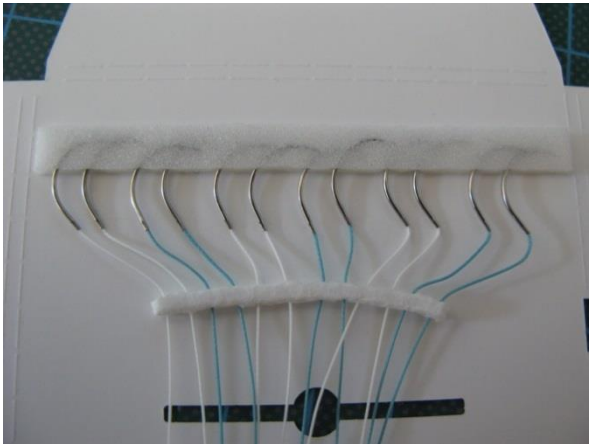
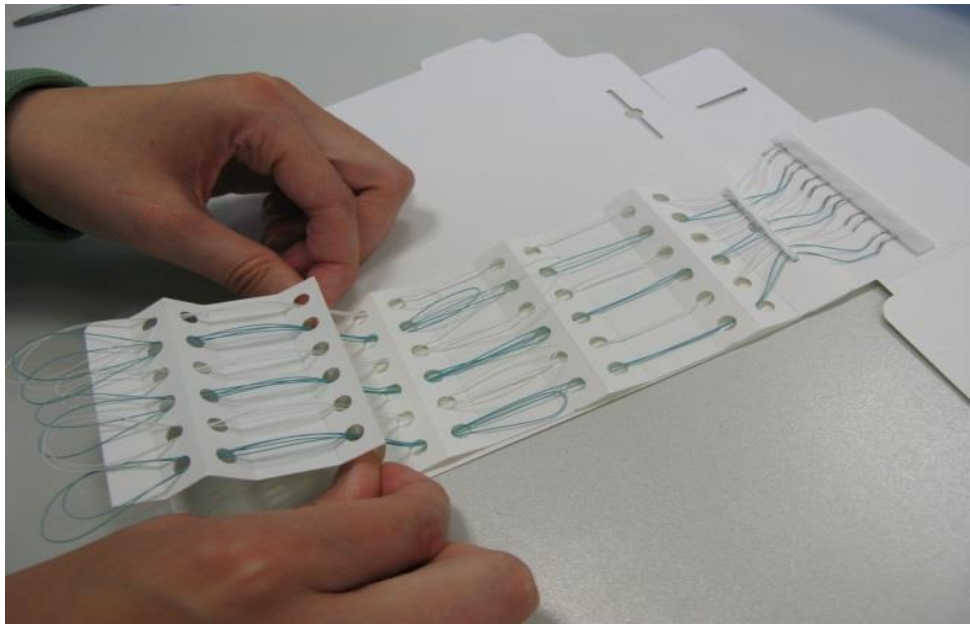


Heart valve surgery - SERACOR

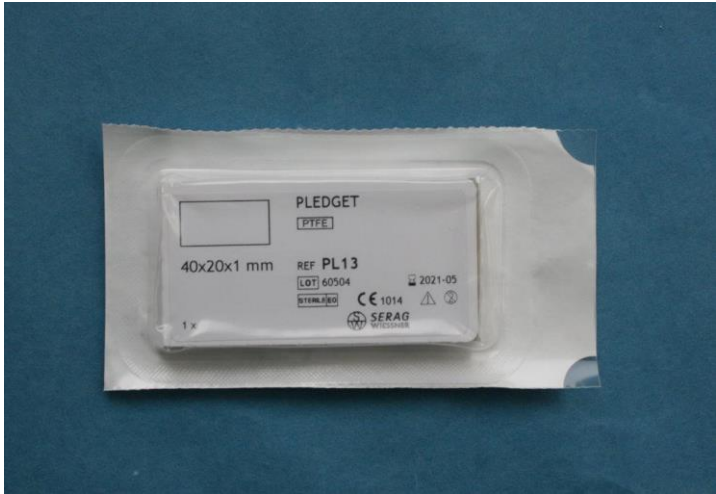
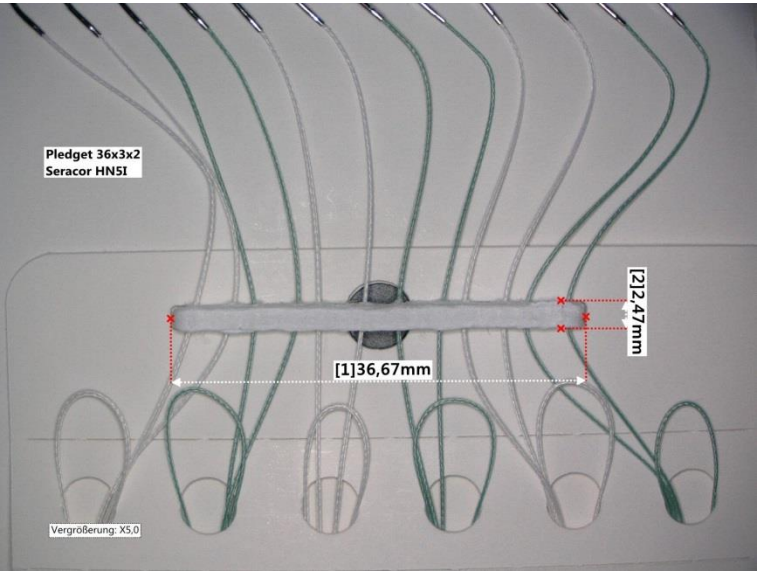
1. SERACOR suture fulfills all requirements for use
2. Especially good knot-holding properties
3. Superior gliding abilities for Minimally Invasive heart surgery
4. Oval pledgets, clean cut and better position in tissue
5. Smaller pledgets 2x3 mm for Pediatric Cardiac Surgery
6. User-friendly packaging
7. Different pack sizes and customized packs possible
8. Best 300-series steel needles



Packaging – customizing I



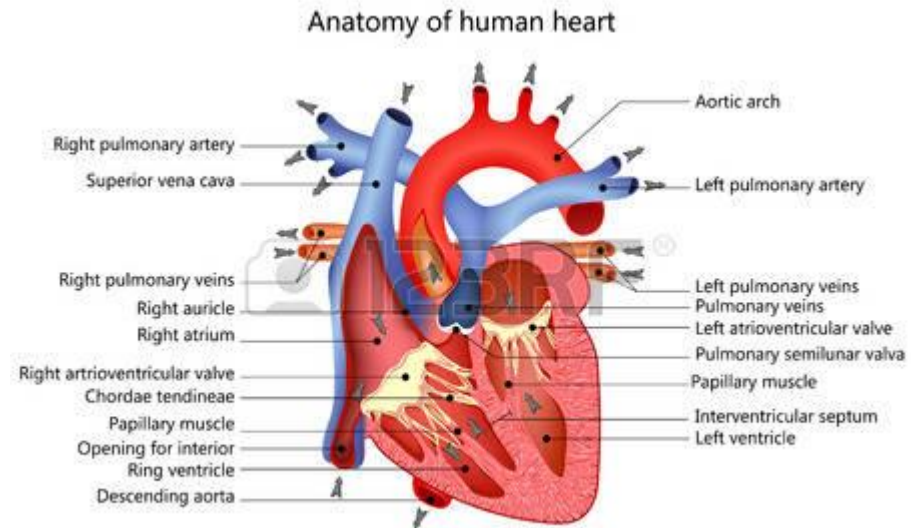
Packaging – customizing II



SERAMON® Chordae Loops

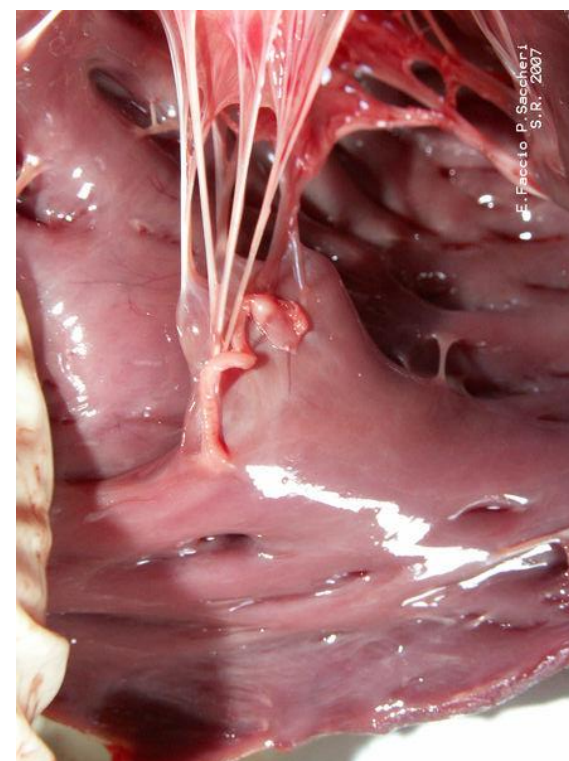
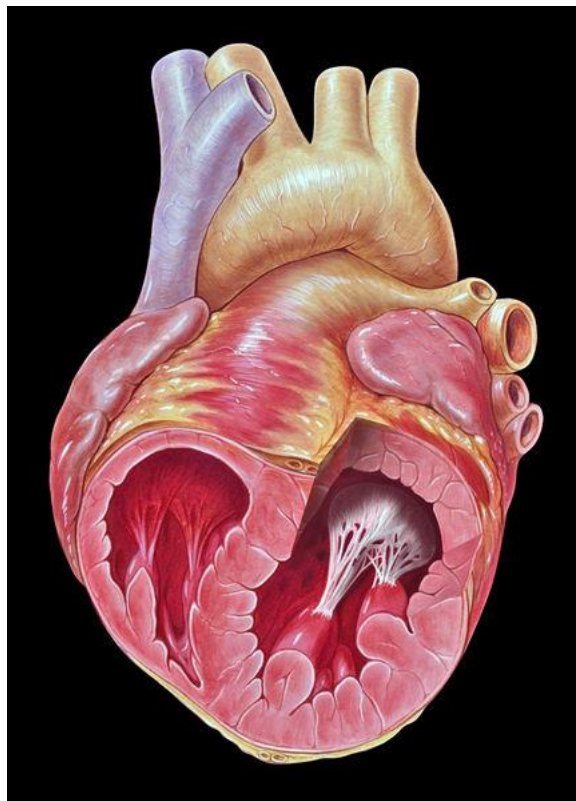
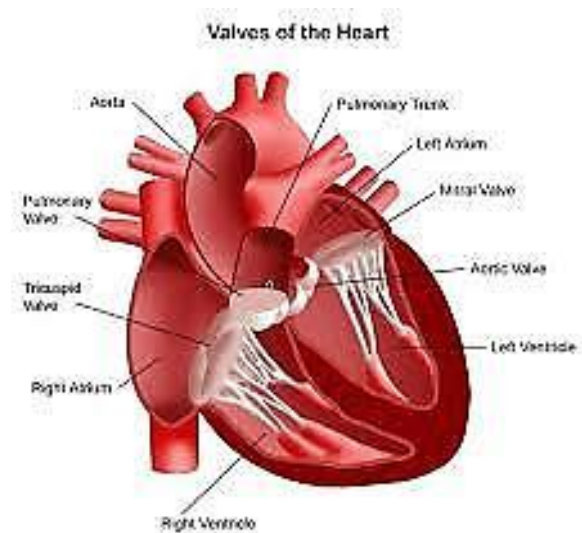


SERAMON® CHORDAE LOOP

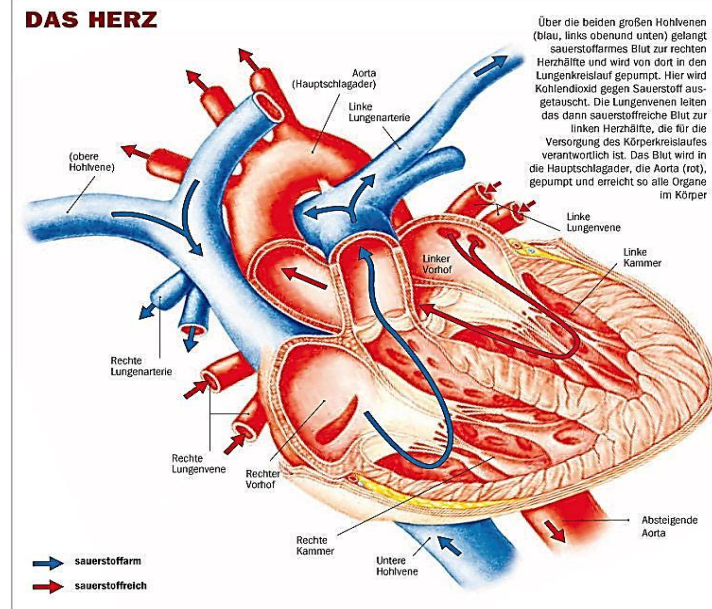
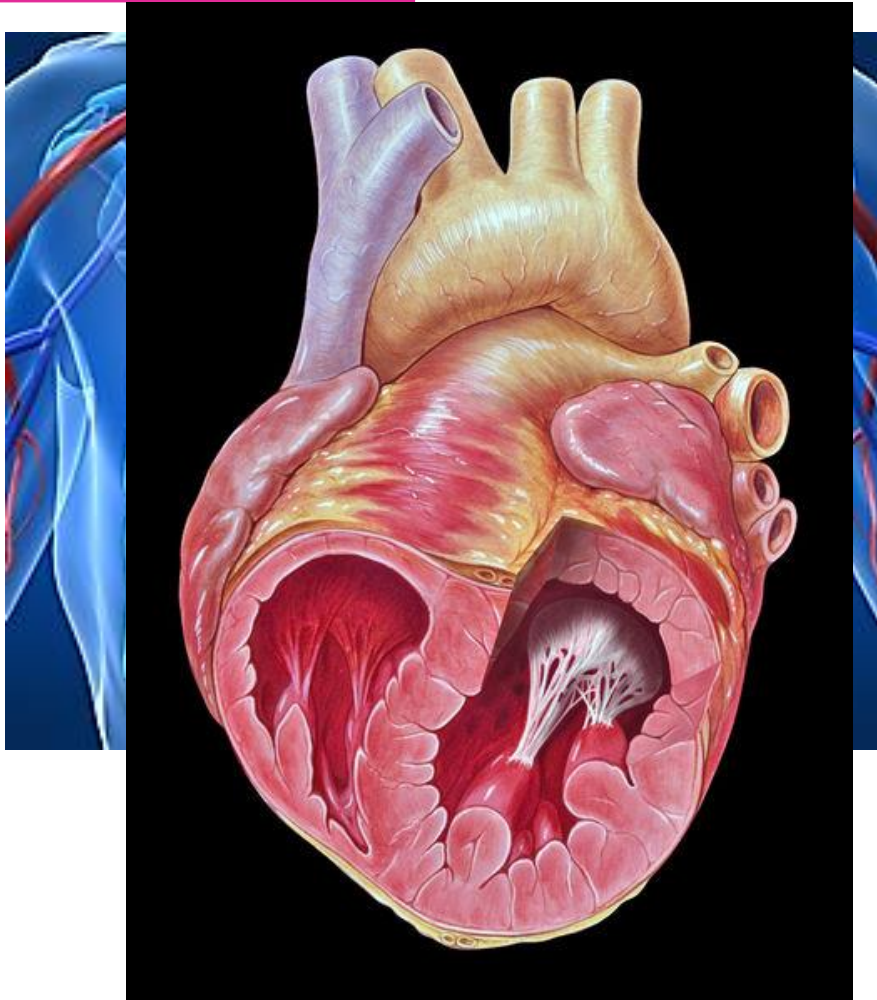


http://www.planet-wissen.de/natur_technik/anatomie_mensch/herz/video_das_herz.jsp

SERAMON® CHORDAE LOOP

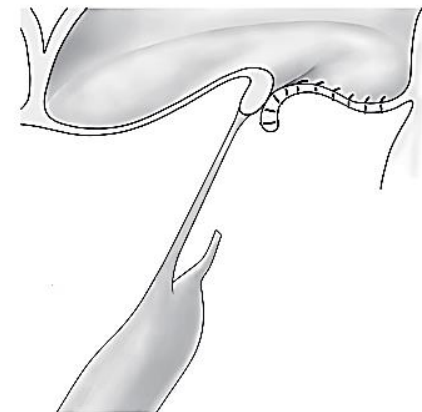
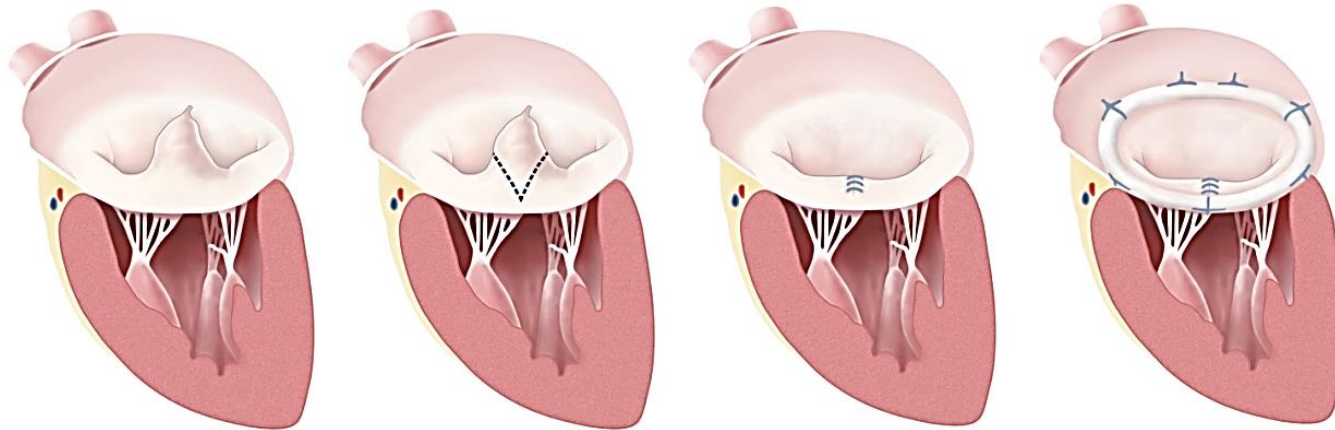


SERAMON® CHORDAE LOOP



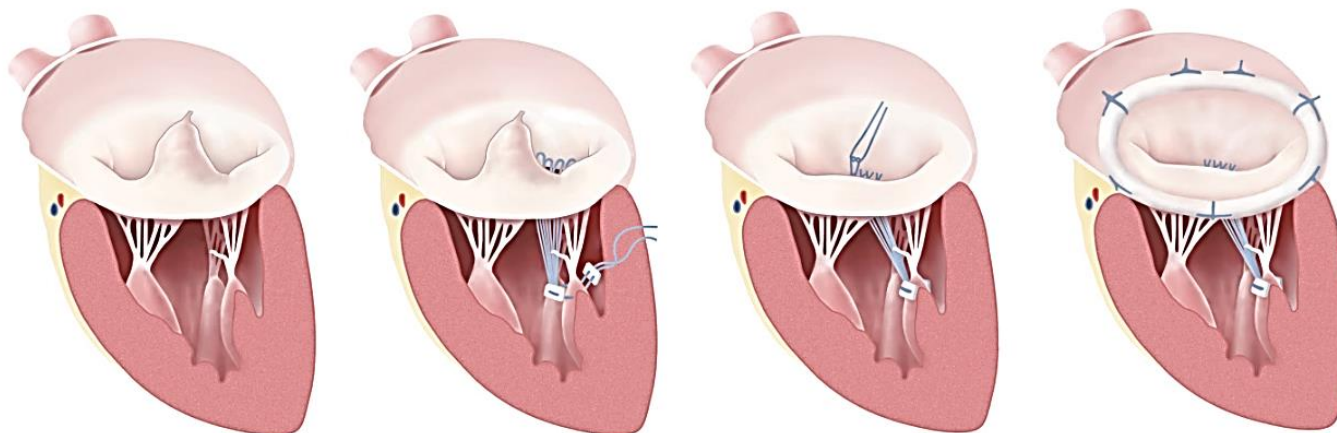
SERAMON® CHORDAE LOOP Method I

**Resektionstechnik
(Carpentier: 1969)**



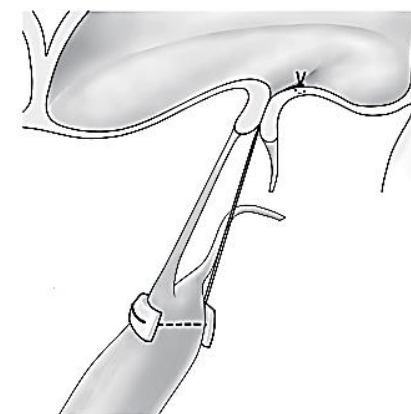
SERAMON® CHORDAE LOOP Method II

„Respect rather than resect“
(David/Frater: 1989-1996)



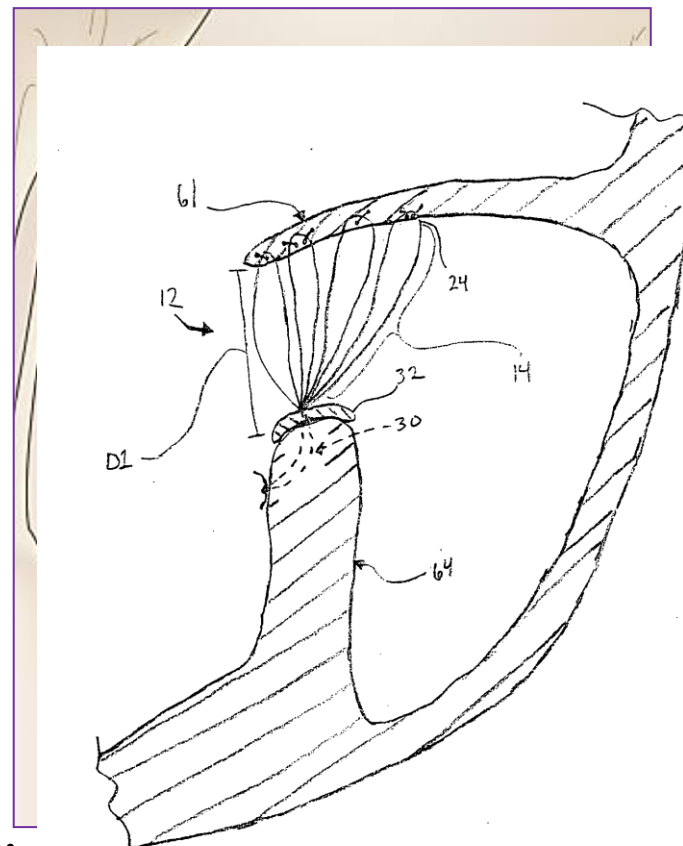
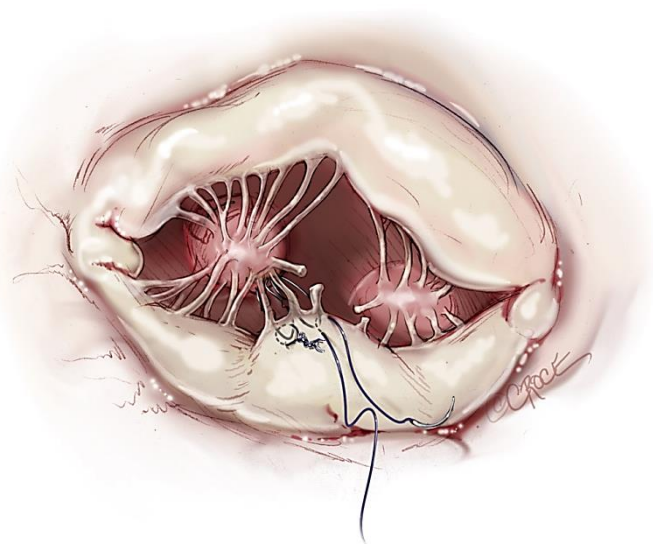
Advantages:

- Better moveability of leaflets
- Bigger seal face
- Anatomy only marginally modified
- Bigger anuloplasty ring → Flow!



SERAMON® CHORDAE LOOP Method III

Loop-Technik
(Mohr: 2000)

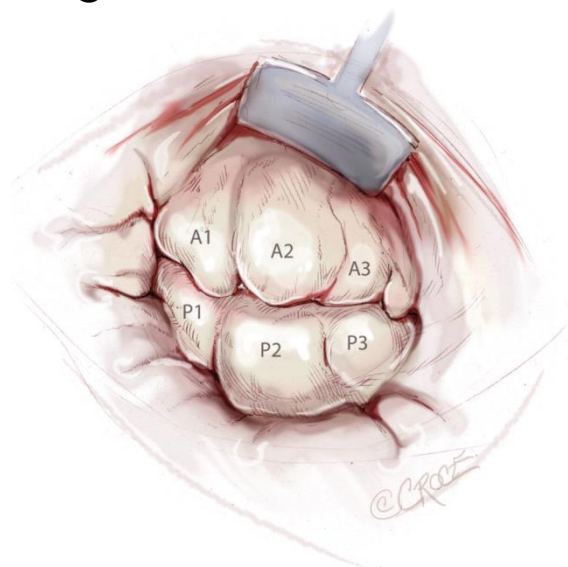


Advantage pre-built loops:

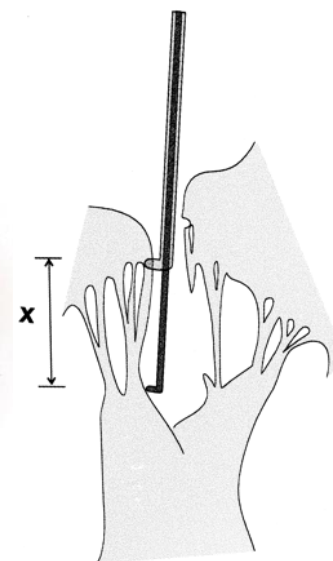
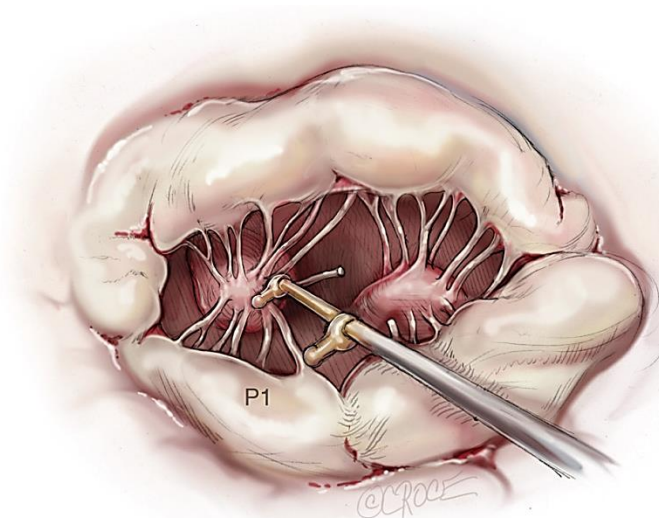
- Only 1 fastening in the depth (fast, secure, atraumatic)
- Only 2 pledgets in all (not 2 / suture)
- Reproducible quality
- Time / cost savings!

SERAMON® CHORDAE LOOP Method IV

Mitral valve - segments



Distance measurement



Mitral valve operations - some figures:

- 30-40.000 ops/a in DE; Stuttgart 600, Leipzig 1.600 / a
- 30-50 % repair instead of replacement, in DE >> 50 %
- 2 % of all develop mitral valve insufficiency
- Freedom of reoperation rep.: 97 % after 5 years
- Longterm survival rep. ≈ Standard healthy person
- Repair = gold standard
- 10 % Tricuspid valve also affected



SERAMON® CHORDAE LOOP

Potential for savings

- Gore-Tex CV-5 with 4 pledgets: 20 € / pc. (= 1 single loop)
- Production time: 10-15 min / loop
- Loop consumption: 1-8 pc., standard: 4
- → Production time: 40-60 min / standard OP
- Costs per minute OP time: 7-120 → 10-30 €
- → Costs single loop: 20 (suture) + 10 min x 10 (30) € = 120 (360) €
- → Costs Chordae Loop (4): 4x20 + 30 min x 10 (30) € = 380 (1140) €
- → 380 € manufacturing vs. 95 € SERAMON CL - Minimum
- → 1.140 € manufacturing vs. 95 € SERAMON CL - Maximum



And additionally:

- Precision of production?
- Sterility?
- Predictability?
- Legal compliance?

SERAMON® CHORDAE LOOP

Advantage - Knot breaking strength

Parameter	Dim	EP	USP	„Gore- USP“	GORE-TEX Suture CV-5	Seramon EP 2 (3-0)
REF		2	3-0	CV-5	5N04A	
Lot.					7680087A	141111
Diameter Mean	mm	0,200- 0,249	0,200- 0,249	0,246	0,267	0,188
Diameter Min	mm				0,255	0,172
Diameter Max	mm				0,287	0,207
knot-pull strength Mean	N	9,0	9,41	10,4	17,40	21,02
knot-pull strength Min					15,03	19,29
knot-pull elongation Mean	%	-	-		3,8	10,3
knot-pull elongation Min	%	-	-		3,4	8,3
Stiffness	mg	-	-		2,224	0,834
Weight per length	g/lf m	-	-		0,115	0,071

Thread Size:	CV-8	CV-7	CV-6	CV-5	CV-4	CV-3	CV-2	CV-0
Approx USP Size:	7-0	6-0	5-0	4-0	3-0	2-0	0	1

SERAMON® CHORDAE LOOP

Advantage - Knot breaking strength

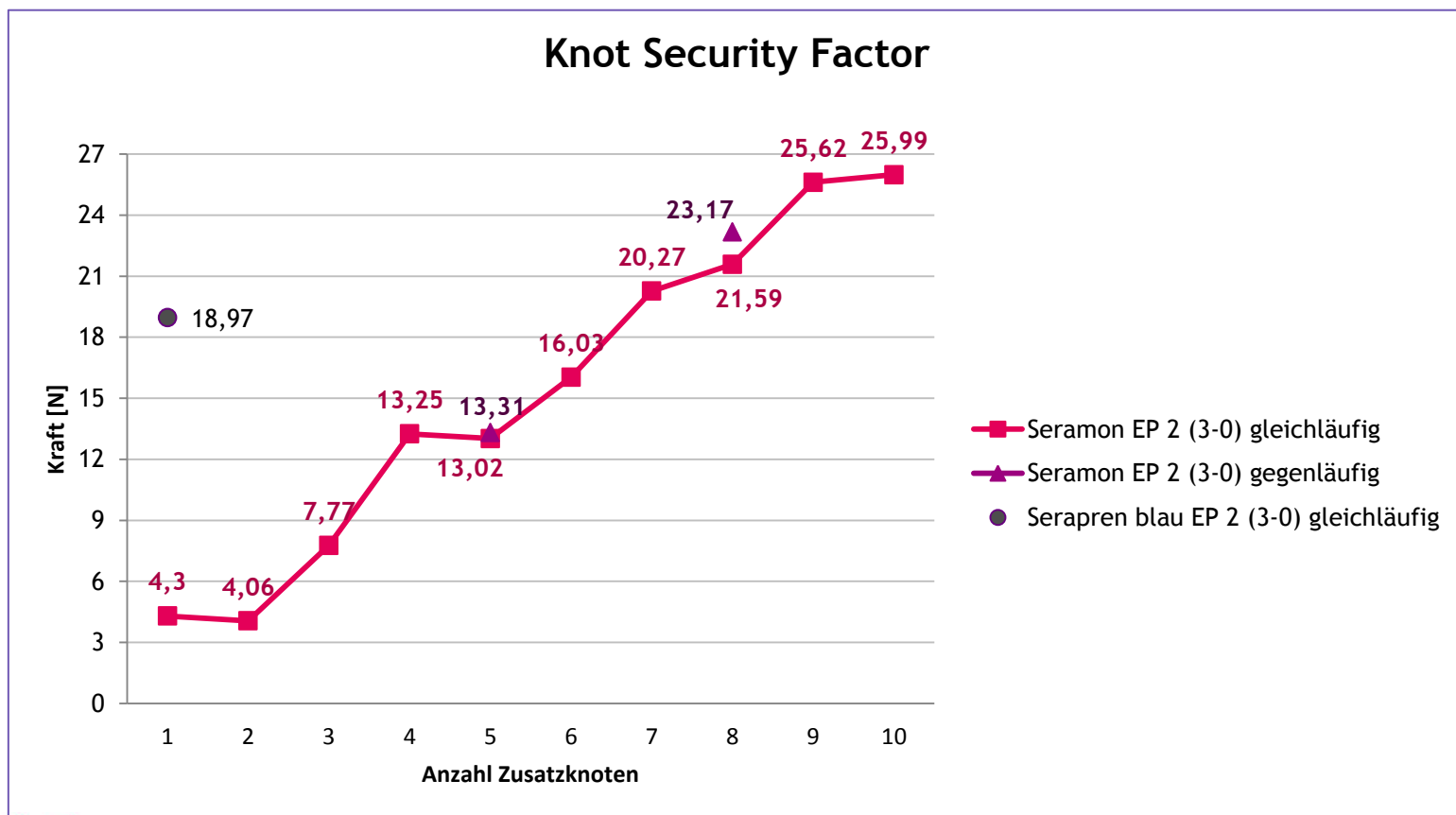
Parameter	Dim	EP	USP	„Gore- USP“	GORE-TEX Suture CV-5	Seramon EP 3 (2-0)
REF		3	2-0	CV-4	5N04A	
Lot.					7680087A	141111
Diameter Mean	mm	0,300- 0,349	0,300- 0,239	0,307	0,267	0,291
Diameter Min	mm				0,255	0,268
Diameter Max	mm				0,287	0,308
knot-pull strength Mean	N	15,0	14,10	17,0	17,40	41,56
knot-pull strength Min					15,03	38,29
knot-pull elongation Mean	%	-	-		3,8	8,7
knot-pull elongation Min	%	-	-		3,4	7,4
Stiffness	mg	-	-		2,224	2,280
Weight per length	g/lf m		-		0,115	0,149

Thread Size:	CV-8	CV-7	CV-6	CV-5	CV-4	CV-3	CV-2	CV-0
Approx USP Size:	7-0	6-0	5-0	4-0	3-0	2-0	0	1

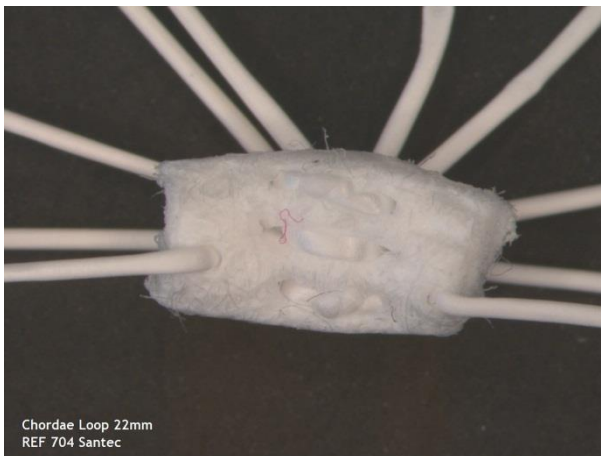
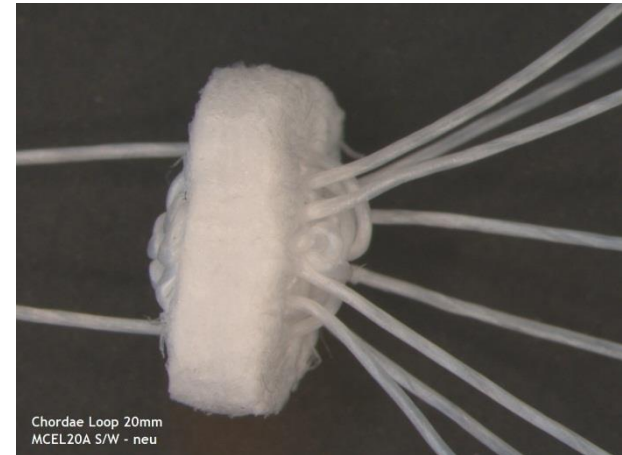
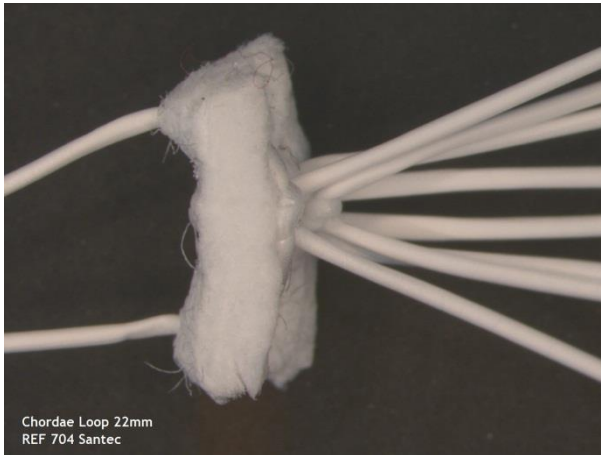
SERAMON® CHORDAE LOOP

Knot security

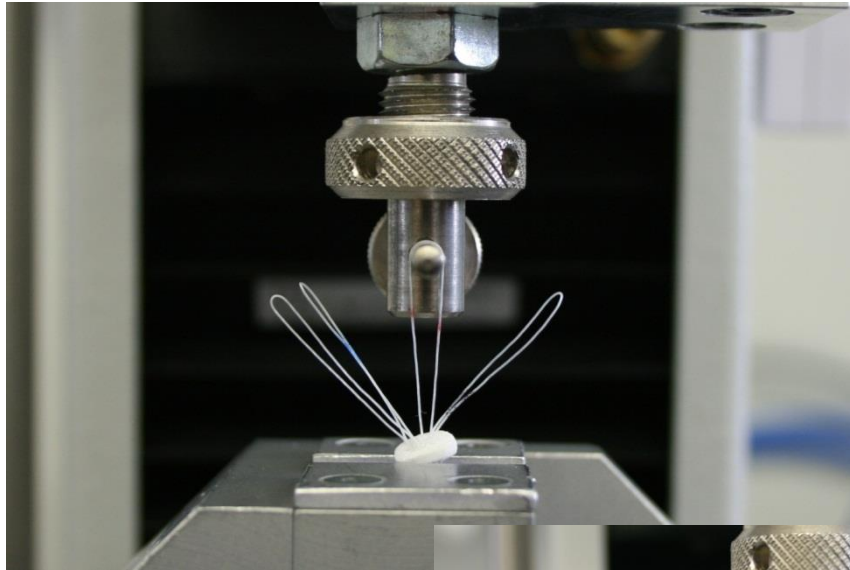
- Higher knot security → Prof. Doll: 4-6 knots vs 10 with Gore
→ Laboratory S/W:



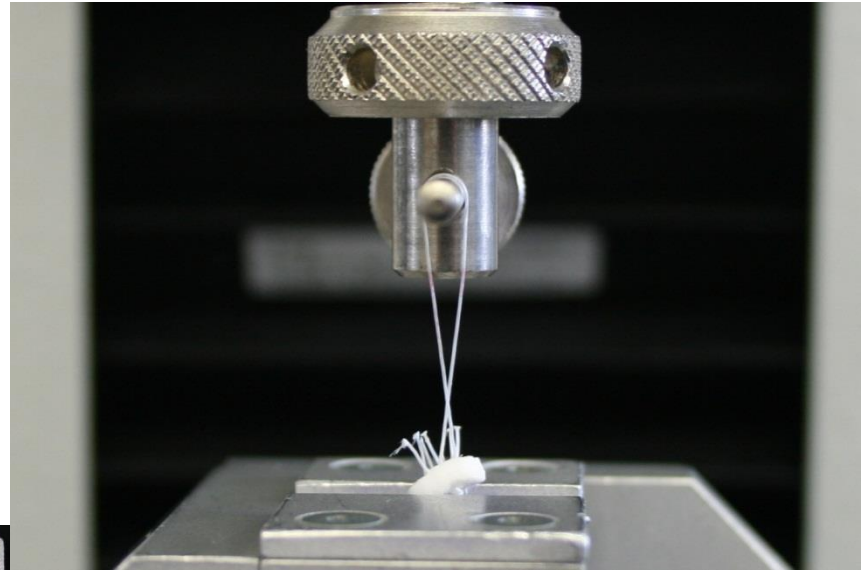
SERAMON® CHORDAE LOOP Construction I



SERAMON® CHORDAE LOOP Construction II



Load: 15 N



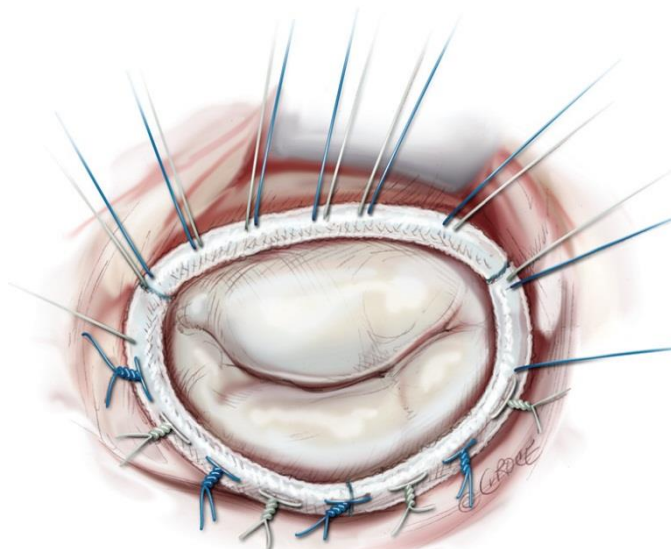
Loop stability
SERAMON CL

Load: 30-50 N

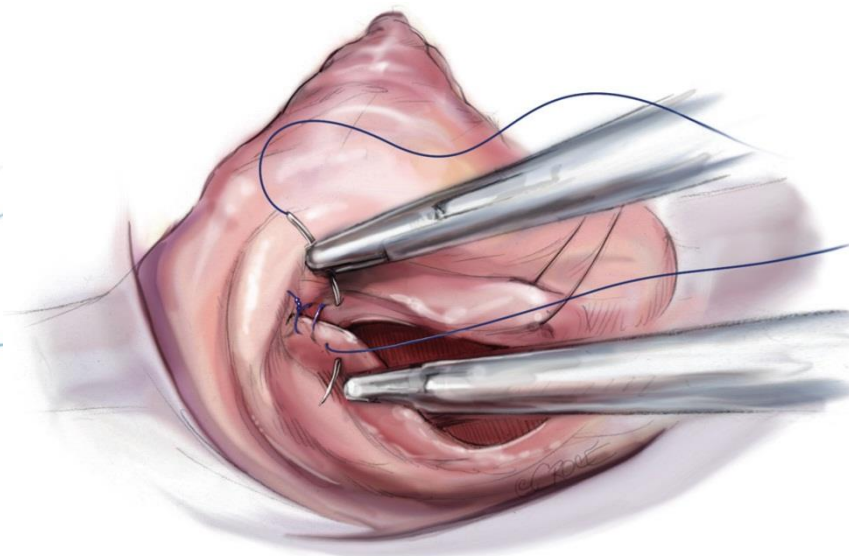
SERAMON® CHORDAE LOOP

What else I

Anuloplasty



Closure of atrium



Something else needed?

- 10-20 valve sutures (anuloplasty), evtl. 2 x
- Monofilaments - SMON! - (accompanying repairs, fixation sutures, closure ...)
vs. polyamides (e.g. Cardionyl), polypropylene (e.g. Prolene)
- Further ideas?

SERAMON® CHORDAE LOOP

What else II

Fixation sutures for Loops

„Every single loop is to be secured by a 90 cm suture, i.e. up to 12 sutures per patient needed“

Example: SERAMON® USP 3-0, 90 cm, HR-17 (Doll)

Individual customer requirement: SERAMON® USP ?, cm ?, needle ?

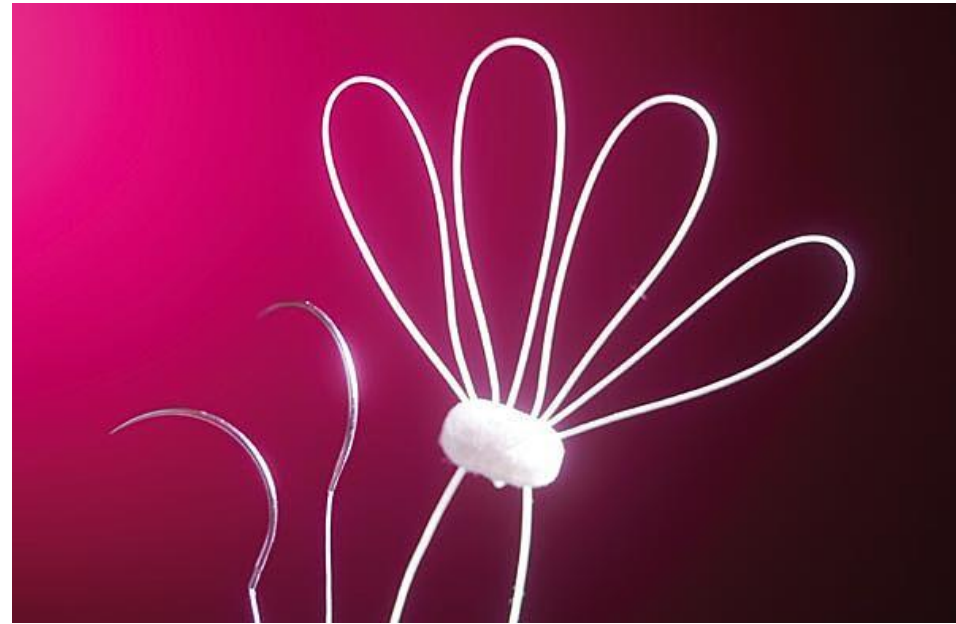
Advantage: same material as SERAMON® CHORDAE LOOP,
s.a. presentation SERAMON!

SERAMON® CHORDAE LOOP

Advantages

- 1) Very high breaking strength (compared to Santec/Gore 1 diameter smaller possible, e.g. SERAMON USP 3/0 instead of CV-4 Santec)
- 2) Length of the needled suture parts constantly 45 cm, no matter what loop size is needed (Santec: 35-42 cm, the bigger the LOOP, the shorter the thread; is often a problem with tall and/or obese patients because of complicated pledget fixation at papillary muscle - suture length is too short); additionally special lengths available on demand
- 3) Better knot security (acc. Prof. Doll: ca. 6 knots vs. ca. 10 with Santec)
- 4) Widespread range of loop sizes: 10 - 30 mm (Santec: 10 - 26 mm)
- 5) Reliable fixation of loops at the pledget, firm construction
- 6) Every needle type needed is possible (Santec: PH17 only - half circle round body needle with cutting microtip. We recommend round body needles without cutting edge to avoid violation of the myocards - especially HR-17 or DR-15)
- 7) Excellent needle quality, among others premium steel quality AISI 300 (American Iron and Steel Institute)
- 8) Oval pledgets to assist perfect anatocal fitting and reduced flow resistance (Santec: in the meantime change from rectangular to oval; maybe forced by us)
- 9) Salespack: 6 Chordae loops (Santec: 4)

Accessories – Pledget



Main parameters

- Material: PTFE, PET, PGALA-PDO...
- Size: L x W x T
- Shape: oval, rectangular, square
- Features: hard, soft, perforated, knitted...
- Mounted, accessory.

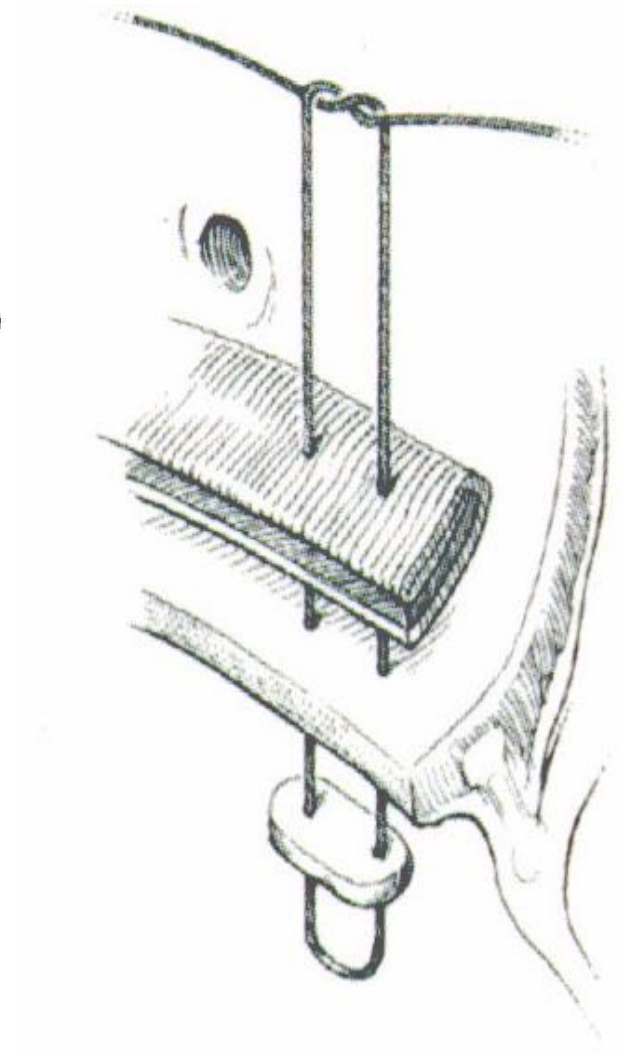
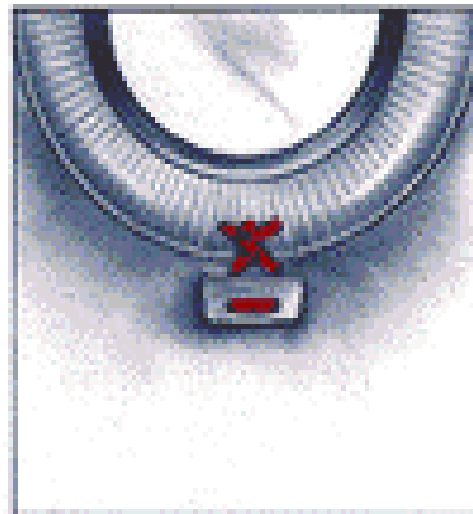
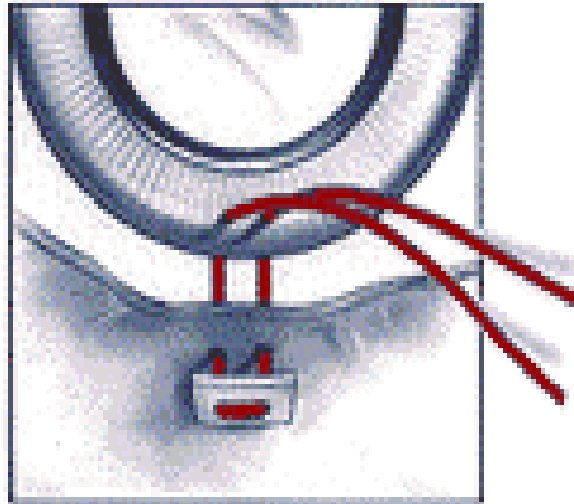


Accessories – Pledget

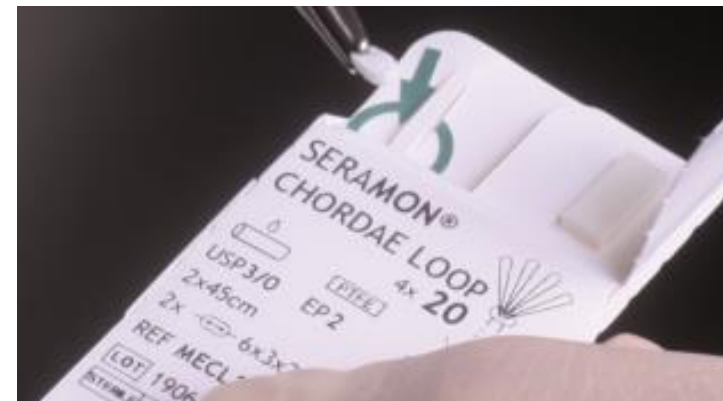
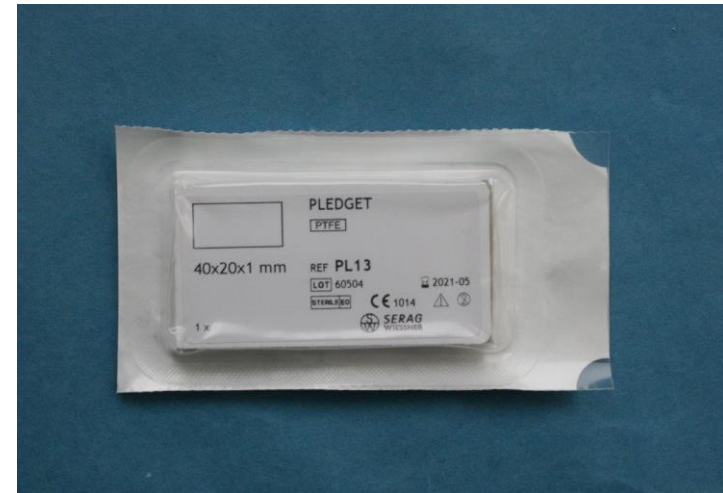
- A pledget is a small flat pad to protect tissue.
- To avoid tearing of the (annular) tissue by the suture during tying, **tension is absorbed by the pledget.**
- To prevent leakage of blood between the prosthesis and the annular tissue, tight compression by sutures and a very close placement of pledgets is required.



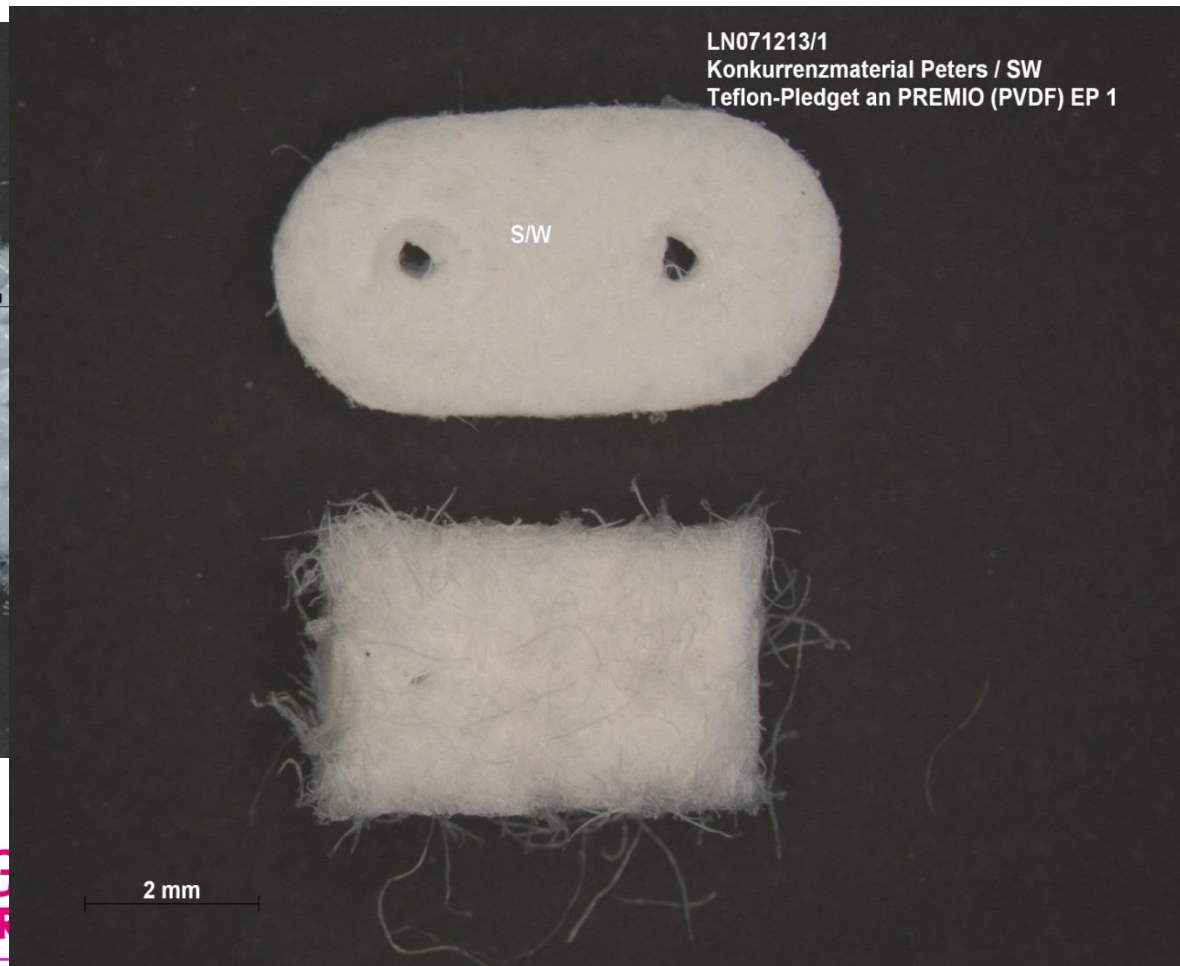
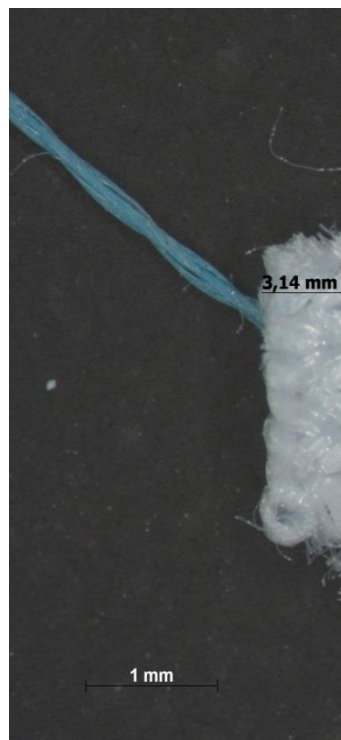
Accessories – Pledget



Accessories – Pledget



Accessories – Pledget - quality



Accessories – Pledget

1. Placement as close as possible (to avoid leakage)
2. No overlaps at the edges, thus preventing the risk of thrombus formation
3. Good adaptation to the surrounding structures
4. Guaranteed optimal alignment of the pledgets
5. Clean cut edges

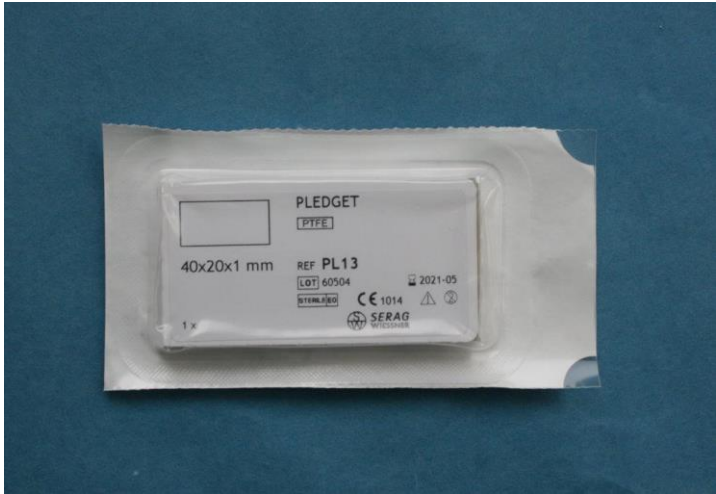
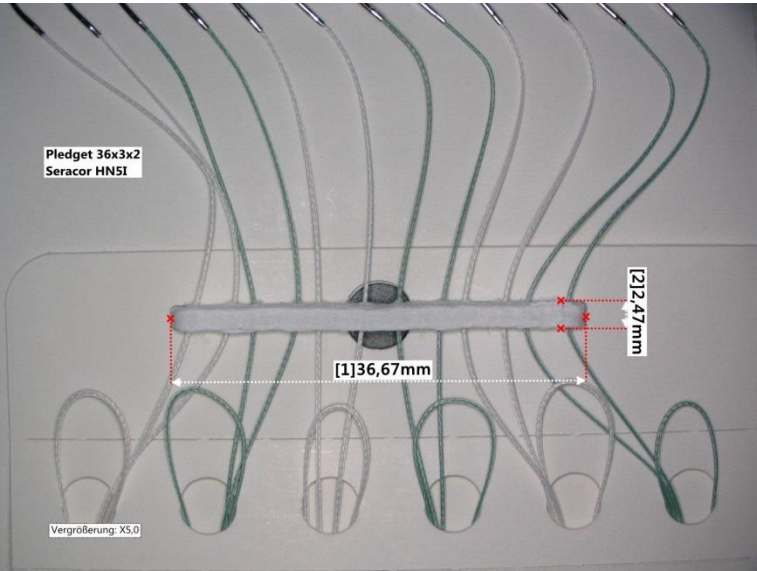


Accessories – Pledget II



PTFE Pledget (unmounted)		
Oval,	6 x 3 x 2 mm,	2 holes / unperforated
Oval,	6 x 3 x 1 mm,	2 perforations
Rectangular,	3 x 2 x 1 mm,	2 perforations
Rectangular,	3 x 2 x 0,5 mm,	2 perforations (SOFT)
Rectangular,	4 x 3 x 0,5 mm,	2 perforations (SOFT)
Rectangular,	9 x 4,5 x 1 mm,	2 perforations (SOFT)
Rectangular,	15 x 10 x 1 mm,	2 perforations (SOFT)
Rectangular,	40 x 20 x 1 mm,	ungelocht (SOFT)
Rectangular,	36 x 3 x 2 mm,	12 perforations
Rectangular,	9 x 4,5 x 1,6 mm,	2 perforations (SOFT)

Packaging – customising II



Paediatric heart surgery

I



OA Dr. med. Horke

MH Hannover Head of Surgery congenital cardiac defects

Paediatric heart surgery - Problems

- Everybody laughs at us, only adults are important
- We are only tolerated in the operation theater, sometimes we have to use child surgery, sometimes heard surgery
- We have to use the (surgical) material, which is on stock
- We are flexible, we manage all adverse conditions
- Really - this thread is also available in thinner sizes?
- Yes, for this indication an asymptotic needle could be the better choice
- ...
- I´m really pleased that we also are visited once in a while!

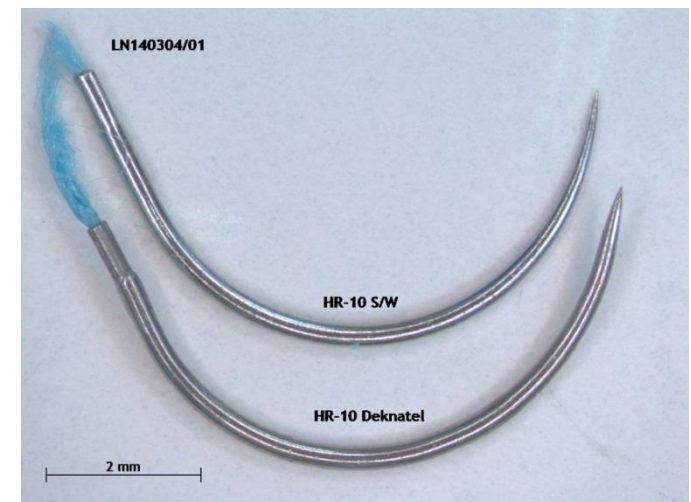
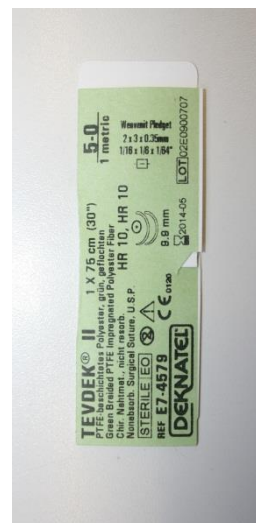
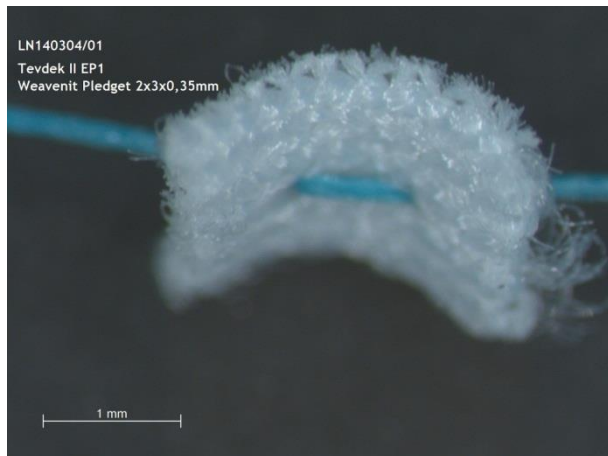
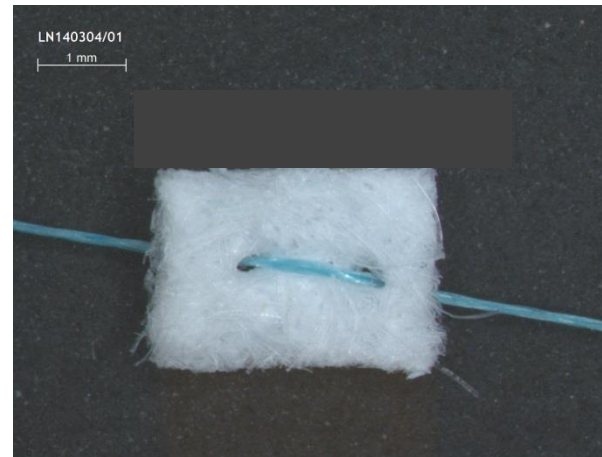
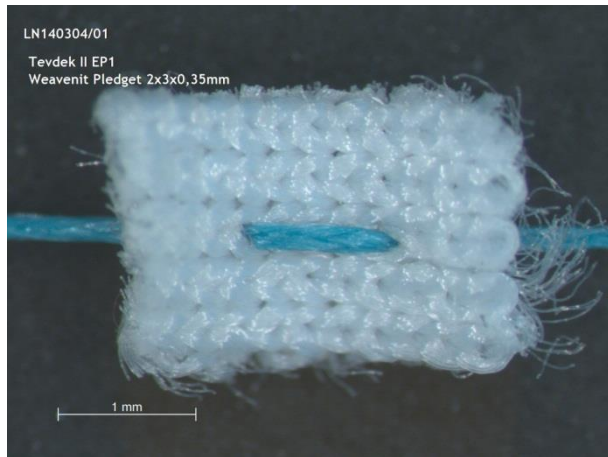
Paediatric heart surgery - Problems

- Any problems with ... ?
- How could we ease / simplify their work?
- How could we make their work pass more quickly?

Paediatric heart surgery - support

- How can we support the paediatric surgeon?
- Special needle-thread-combinations
- Calcified tissues: DSM- / HRM-Typen - optimized micro tip
- Restricted access: asymptotic needles (small: 7-12!)
- Small / thin pledgets: restriction of bloodflow, displacement of structures → insufficient heart valves
- Transfer tables from competition to Serag-Wiessner
- Limited interest of competitors: Ethicon, Deknatel...
- Conversion to SERAMON
- Special heart valve sutures → HN5H, ...
- Conversion to Serasynth (from non absorbables)
- Specialty products make conversion easier (pledgets)
- ...

Paediatric heart surgery - quality

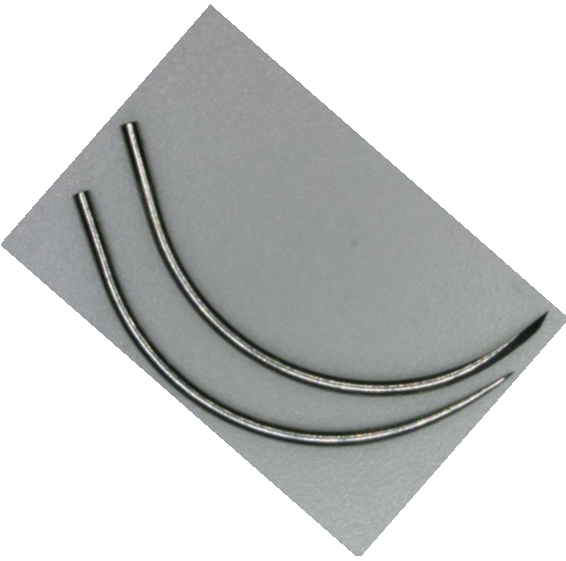


Paediatric heart surgery - support II



Art-N0.	Description						Pack.unit sachets
SW	Material	EP	USP	Length	Needle	Pledget	
9O354448	SERASYNTH vio 3,5 (0)			1x0,90	HRX-36		24
9O404448	SERASYNTH vio 4 (1)			1x0,90	HRX-36		24
9P0532V3	SERASYNTH vio0,5(7/0)			1x0,70	2xDRM-9		24
9P07327C	SERASYNTH vio0,7(6/0)			1x0,70	2xHR-10		24
9P0732V3	SERASYNTH vio0,7(6/0)			1x0,70	2xDRM-9		24
9P10321A	SERASYNTH vio 1 (5/0)			1x0,70	2xDR-12		24
9P10440E	SERASYNTH vio 1 (5/0)			1x0,90	2xHRT-17		24
9P104438	SERASYNTH vio 1 (5/0)			1x0,90	2xHR-12		24
9P15440E	SERASYNTH vio1,5(4/0)			1x0,90	2xHRT-17		24
9P15441E	SERASYNTH vio1,5(4/0)			1x0,90	2xHRT-20		24
9P15442A	SERASYNTH vio1,5(4/0)			1x0,90	2xDR-17		24
9P20440E	SERASYNTH vio 2 (3/0)			1x0,90	2xHRT-17		12
9P20441E	SERASYNTH vio 2 (3/0)			1x0,90	2xHRT-20		12
9P30442E	SERASYNTH vio 3 (2/0)			1x0,90	2xHRT-26		12
CO10341A	SERAPREN bl 1 (5/0)			1x0,75	DR-12		24
CO15342A	SERAPREN bl 1,5 (4/0)			1x0,75	DR-17		24
CP0534V3	SERAPREN bl 0,5 (7/0)			1x0,75	2xDRM-9		24
CP0734V3	SERAPREN bl 0,7 (6/0)			1x0,75	2xDRM-9		24
CP07447C	SERAPREN bl 0,7 (6/0)			1x0,90	2xHR-10		24
CP07449B	SERAPREN bl 0,7 (6/0)			1x0,90	2xHR-6		24
CP10341A	SERAPREN bl 1 (5/0)			1x0,75	2xDR-12		24
CP10440C	SERAPREN bl 1 (5/0)			1x0,90	2xHR-12		24
CP10440E	SERAPREN bl 1 (5/0)			1x0,90	2xHRT-17		24
CP15440E	SERAPREN bl 1,5 (4/0)			1x0,90	2xHR-12		24
CP15441E	SERAPREN bl 1,5 (4/0)			1x0,90	2xHRT-20		24
CP15442A	SERAPREN bl 1,5 (4/0)			1x0,90	2xDR-17		24
CP15442E83	SERAPREN bl 1,5 (4/0)			1x0,90	2xHRT-26	6x3x1	24
CP20440E	SERAPREN bl 2 (3/0)			1x0,90	2xHRT-17		24
CP20441E	SERAPREN bl 2 (3/0)			1x0,90	2xHRT-20		24
CP30442E	SERAPREN bl 3 (2/0)			1x0,90	2xHRT-26		24
HN26	SERACOR gr/un 3,5 (0)			4x90	2xHRT-26	6x3x2	12
HN4V	SERACOR gr/un 3 (2/0)			4x75	2xHRT-17	6x3x1	12
HN5H	SERACOR gr 1 (5/0)			1x75	2xHR-10	2x3x0,5	24
HN63	SERACOR gr 1 (5/0)			1x75	2xHR-10	2x3x2	24
HN64	SERACOR gr 1,5 (4/0)			1x75	2xHR-12	2x3x2	24
HN74	SERACOR gr/un 3,5 (0)			4x90	2xHR-20	6x3x2	12

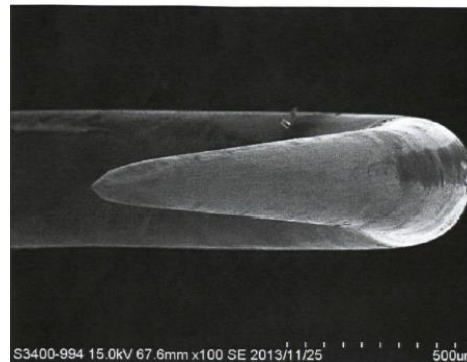
Needles – heart surgery – R, RM, RT



Round body



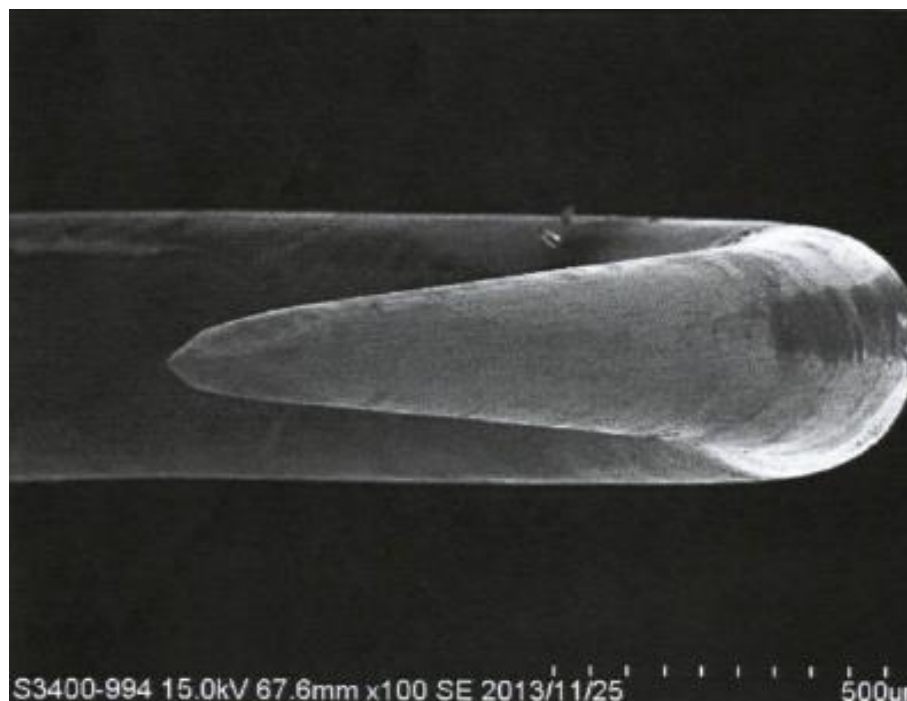
Trocar point



Micro tip

Coronary bypass surgery - Vascuprime

Microtip: Taper
needle with
short cutting
point.



**Use: Heart- / Vessel surgery,
e.g. for tough, calcified vessels.**

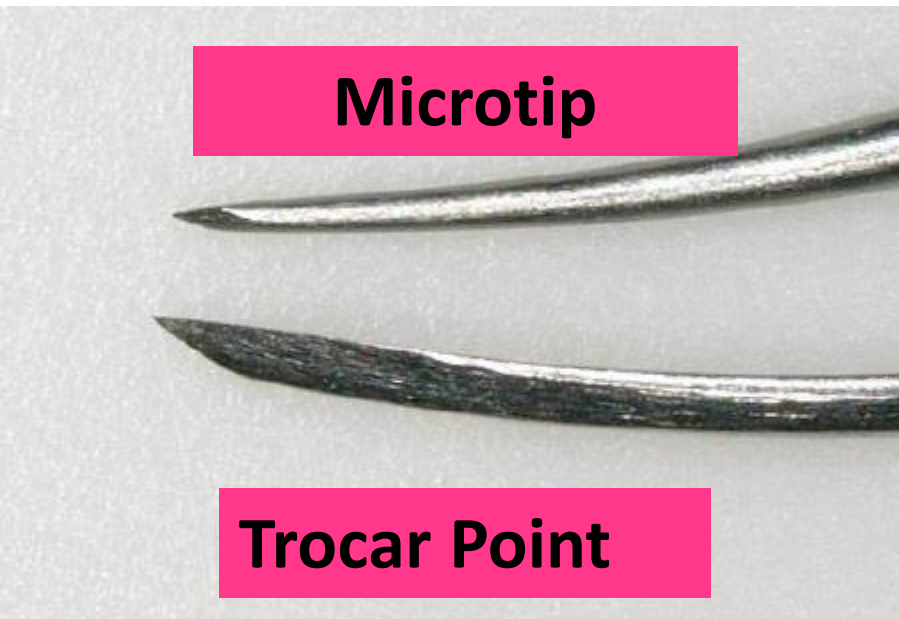
Coronary bypass surgery - Vascuprime

Complications

...the most common complication is excessive postoperative bleeding at the puncture site (vein donor site or bypass sites) in the artery with the formation of a large hematoma (clot) that has to be removed...

→ minimal trauma and least blood loss are very important, especially in bypass surgery.

Coronary bypass surgery - Vascuprime



Microtip

Much **smaller tip** / cutting edge →

smaller penetretion holes.

Penetration holes only half as big
(measured by microscope) →

Trocar Point

**Massive reduction in blood loss
during surgery.**

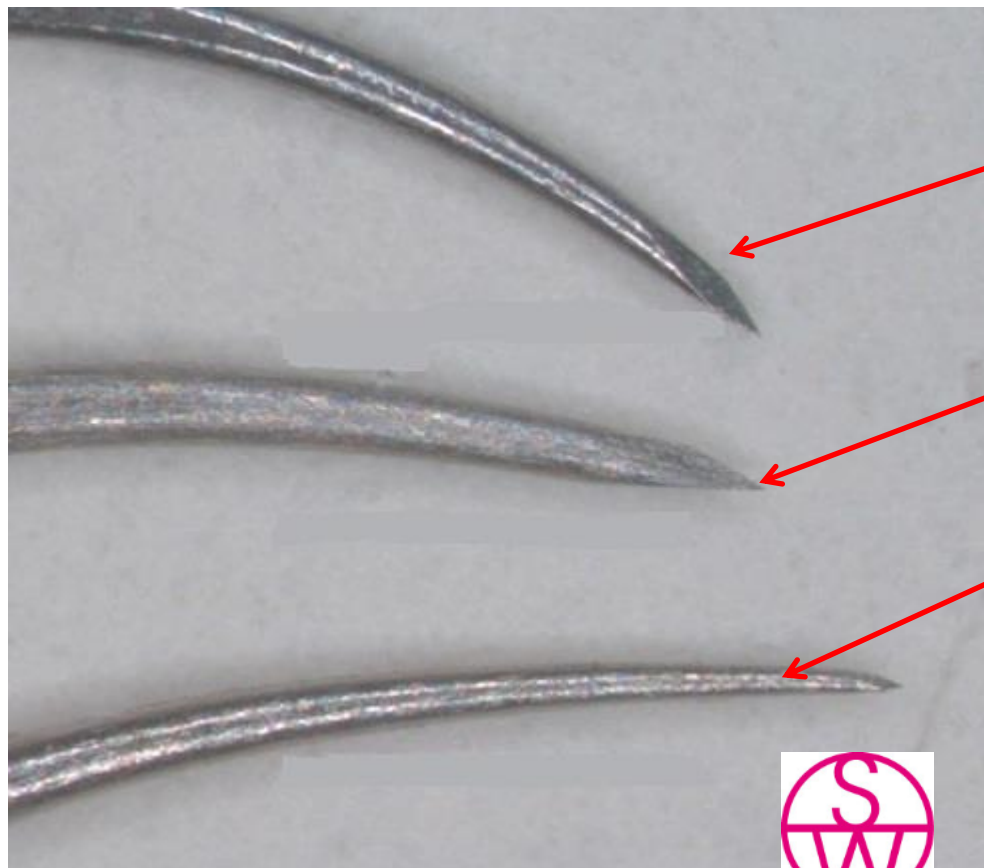


Trocar Point

Microtip

Coronary bypass surgery - Vascuprime

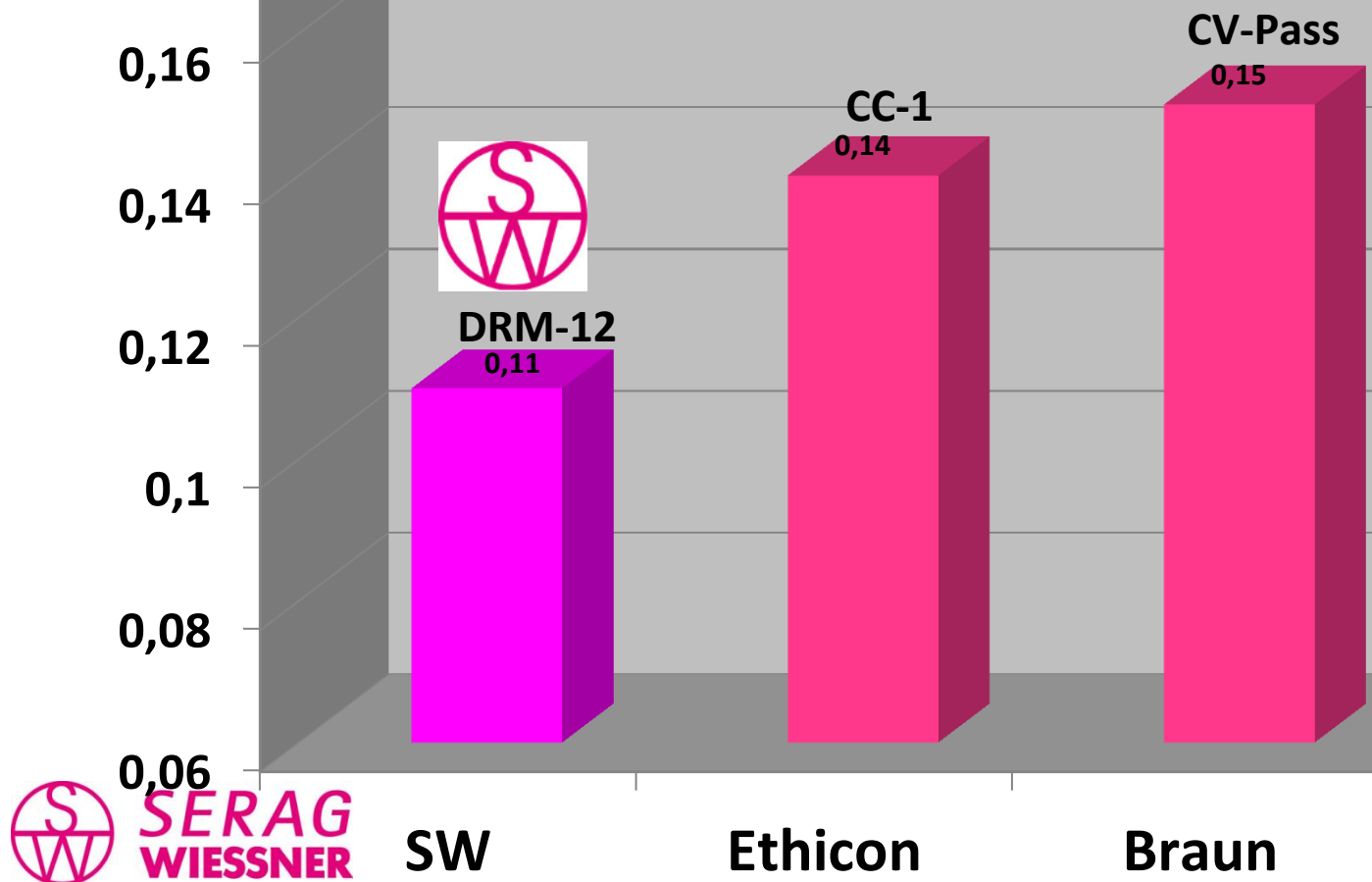
Needles with Microtip - Competition



- **CV-Pass DRC-12**
Microtip: Braun
- **CC-1: Ethicon**
- **DRM-12: SW**
Smallest and thinnest tip.

Cardiac Surgery

Penetration Force / N



**Serag-Needle
has best /
lowest
penetration
force.**

**...30% better
compared to**

- **CC-1-
Needle /
Ethicon**
- **CV-Pass /
Braun.**

Vascuprime

Needle	SERAG- WIESSNER Art.-No.	Description	Packag.- Unit sachets	
2xDRM-6	CP0428V2	SERAPREN bl 0,4 (8/0) 1x0,60 2xDRM-6 1D	12	
DRM-9	CO0534V3	SERAPREN bl 0,5 (7/0) 1x0,75 DRM-9 2D	24	
2xDRM-9	CP0528V3	SERAPREN bl 0,5 (7/0) 1x0,60 2xDRM-9 2D	24	
	CP0534V3	SERAPREN bl 0,5 (7/0) 1x0,75 2xDRM-9 2D	24	
	CP0734V3	SERAPREN bl 0,7 (6/0) 1x0,75 2xDRM-9 2D	24	
	LP0534V3	SERALENE bl 0,5 (7/0) 1x0,75 2xDRM-9 2D	24	
	LP0734V3	SERALENE bl 0,7 (6/0) 1x0,75 2xDRM-9 2D	24	
	9P0532V3	SERASYNTH vio0,5(7/0) 1x0,70 2xDRM-9 2D	24	
	9P0732V3	SERASYNTH vio0,7(6/0) 1x0,70 2xDRM-9 2D	24	
DRM-12	LO0734V4	SERALENE bl 0,7 (6/0) 1x0,75 DRM-12 2D	24	
	LO1034V4	SERALENE bl 1 (5/0) 1x0,75 DRM-12 2D	24	
	LO1534V4	SERALENE bl 1,5 (4/0) 1x0,75 DRM-12 2D	24	
2xDRM-12	CP0728V4	SERAPREN bl 0,7 (6/0) 1x0,60 2xDRM-12 2D	24	
	CP0734V4	SERAPREN bl 0,7 (6/0) 1x0,75 2xDRM-12 2D	24	
	CP1034V4	SERAPREN bl 1 (5/0) 1x0,75 2xDRM-12 2D	24	
	CP1044V4	SERAPREN bl 1 (5/0) 1x0,90 2xDRM-12 2D	24	
	LP0734V4	SERALENE bl 0,7 (6/0) 1x0,75 2xDRM-12 2D	24	
	LP079VV4	SERALENE bl 0,7 (6/0) 1x0,90 2xDRM-12 1D	12	
	LP1034V4	SERALENE bl 1 (5/0) 1x0,75 2xDRM-12 2D	24	
	LP1044V4	SERALENE bl 1 (5/0) 1x0,90 2xDRM-12 2D	24	
	MEP0744V4	SERAMON un 0,7 (6/0) 1x0,90 2xDRM-12 2D	24	
	MEP1044V4	SERAMON un 1 (5/0) 1x0,90 2xDRM-12 2D	24	
DRM-17	LO1534V7	SERALENE bl 1,5 (4/0) 1x0,75 DRM-17 2D	24	
2xDRM-17	LP1544V7	SERALENE bl 1,5 (4/0) 1x0,90 2xDRM-17 2D	24	
HRM-20	LO2034V0	SERALENE bl 2 (3/0) 1x0,75 HRM-20 2D	24	
2xHRM-22	LP2044V9	SERALENE bl 2 (3/0) 1x0,90 2xHRM-22 2D	24	
HRM-26	LO1534V6	SERALENE bl 1,5 (4/0) 1x0,75 HRM-26 2D	24	
	LO2034V6	SERALENE bl 2 (3/0) 1x0,75 HRM-26 2D	24	
2xHRM-26	CP2044V6	SERAPREN bl 2 (3/0) 1x0,90 2xHRM-26 2D	24	
	CP2048V6	SERAPREN bl 2 (3/0) 1x1,20 2xHRM-26 2D	24	
	LP1544V6	SERALENE bl 1,5 (4/0) 1x0,90 2xHRM-26 2D	24	
	LP2048V6	SERALENE bl 2 (3/0) 1x1,20 2xHRM-26 2D	24	
2xHRM-36	LP2048V8	SERALENE bl 2 (3/0) 1x1,20 2xHRM-36 2D	24	

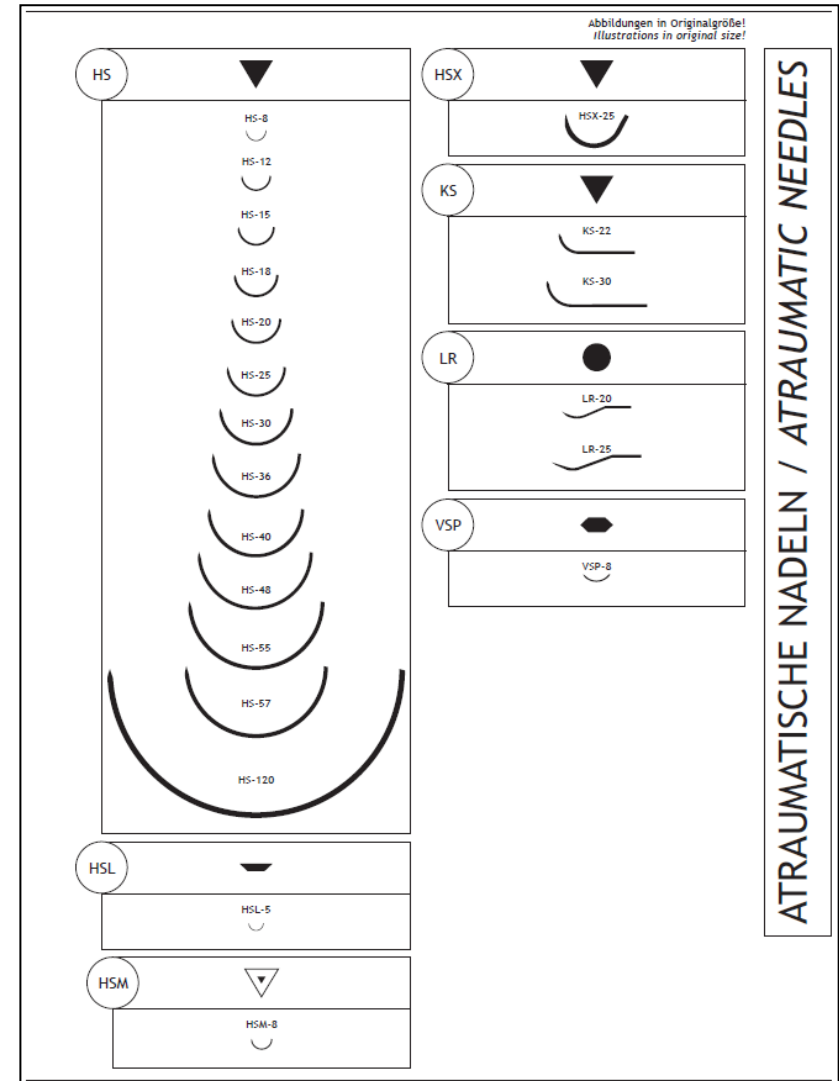
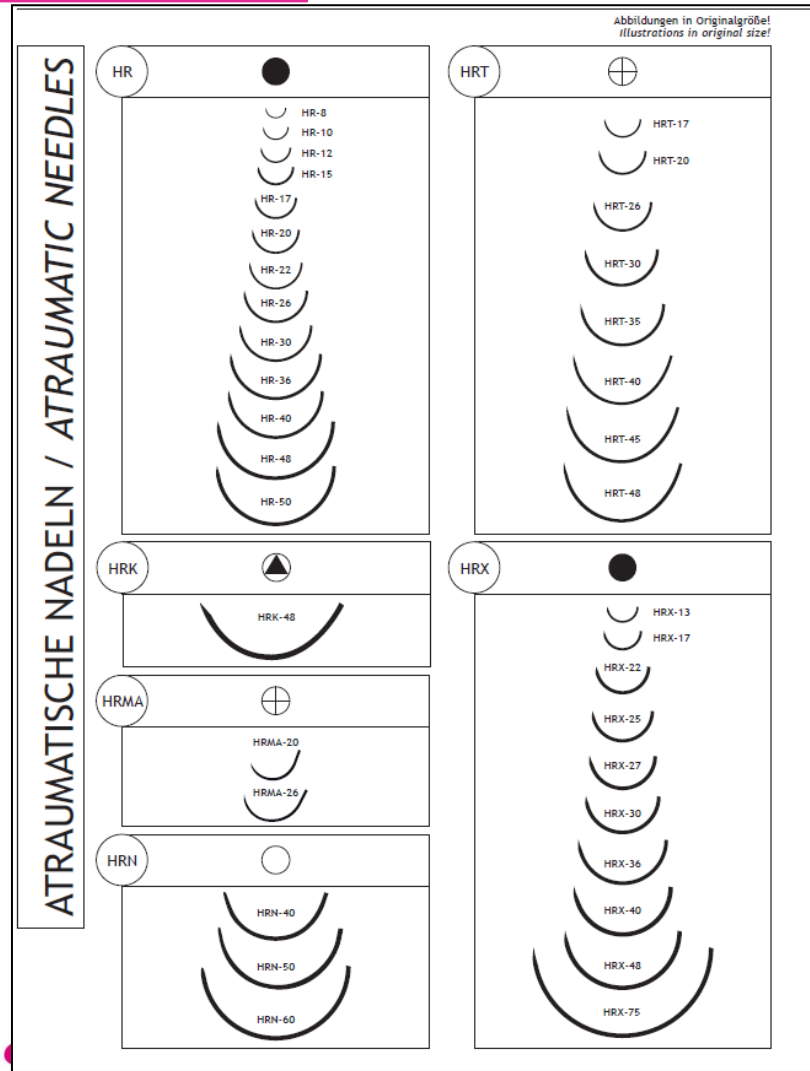
Needles – variants I

High variability

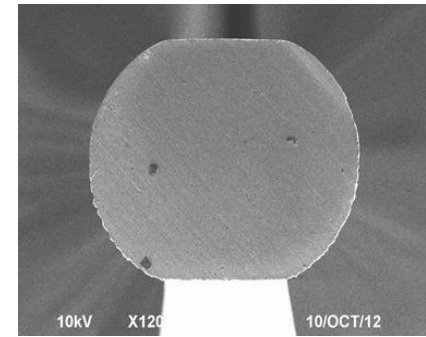
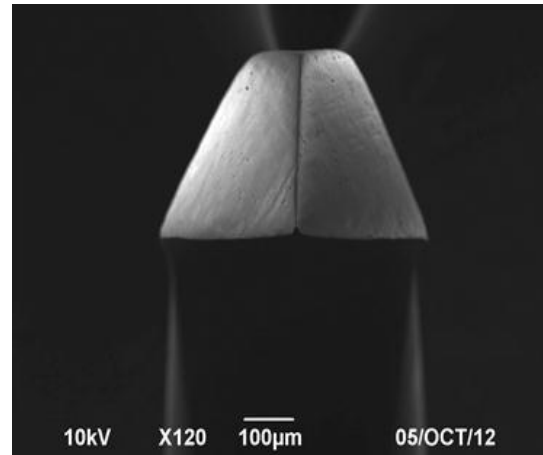
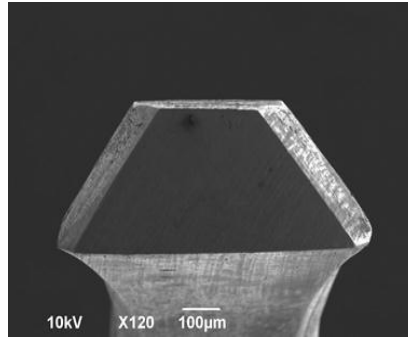
- Shape (tip, body)
- Point grinding
- Diameter (tip, body)
- Coating (silicone)
- Bore hole
- Steel quality (420, 455, 300)
- Colour (blank, black)

Nadelbezeichnung Needle	Symbol des Nadelquerschnitts Symbol of section	Beschreibung Description	Nadelbezeichnung Needle	Symbol des Nadelquerschnitts Symbol of section	Beschreibung Description
DQL		$\frac{1}{2}$ kreisförmig, quadratischer Nadelkörper mit Lanzettspitze $\frac{1}{2}$ circle, square bodied needle with lancet point	GR		gerade, Rundkörpernadel straight, round-bodied needle
DR		$\frac{1}{2}$ kreisförmig, Rundkörpernadel $\frac{1}{2}$ circle, round-bodied needle	GS		gerade, schneidender Nadelkörper straight, cutting needle
DRM		$\frac{1}{2}$ kreisförmig, Rundkörpernadel mit Mikrokurzschnitt $\frac{1}{2}$ circle, round-bodied needle with micro point	HR		$\frac{1}{2}$ kreisförmig, Rundkörpernadel $\frac{1}{2}$ circle, round-bodied needle
DRN		$\frac{1}{2}$ kreisförmig, Rundkörpernadel, stumpf $\frac{1}{2}$ circle, round-bodied needle, blunt	HRK		$\frac{1}{2}$ kreisförmig, Rundkörpernadel, kurze innenliegende Schneide $\frac{1}{2}$ circle, round-bodied needle, taper cutting
DRT		$\frac{1}{2}$ kreisförmig, Rundkörpernadel mit Trokarspitze (Trokarnadel) $\frac{1}{2}$ circle, round-bodied needle with trocar point (trocar needle)	HRMA		$\frac{1}{2}$ kreisförmig, Rundkörpernadel mit Mikrokurzschnitt, asymmetrisch $\frac{1}{2}$ circle, round-bodied needle with micro point, asymptotic
DRTA		$\frac{1}{2}$ kreisförmig, Rundkörpernadel mit Trokarspitze (Trokarnadel), asymmetrisch $\frac{1}{2}$ circle, round-bodied needle with trocar point (trocar needle), asymptotic	HRN		$\frac{1}{2}$ kreisförmig, Rundkörpernadel, stumpf $\frac{1}{2}$ circle, round-bodied needle, blunt
DS		$\frac{1}{2}$ kreisförmig, schneidender Nadelkörper $\frac{1}{2}$ circle, reverse cutting needle	HRT		$\frac{1}{2}$ kreisförmig, Rundkörpernadel mit Trokarspitze (Trokarnadel) $\frac{1}{2}$ circle, round-bodied needle with trocar point (trocar needle)
DSL		$\frac{1}{2}$ kreisförmig, schneidender Nadelkörper mit Lanzettspitze $\frac{1}{2}$ circle, cutting needle with lancet point	HRX		$\frac{1}{2}$ kreisförmig, Rundkörpernadel (extra starke Nadel) $\frac{1}{2}$ circle, round-bodied needle (extra strong needle)
DSLA		$\frac{1}{2}$ kreisförmig, schneidender Nadelkörper mit Lanzettspitze, asymmetrisch $\frac{1}{2}$ circle, cutting needle with lancet point, asymptotic	HS		$\frac{1}{2}$ kreisförmig, schneidender Nadelkörper $\frac{1}{2}$ circle, reverse cutting needle
DSS		$\frac{1}{2}$ kreisförmig, schneidender Nadelkörper, Spezialspitze mit schlankem Anschliff $\frac{1}{2}$ circle, reverse cutting needle, special point, slim	HSL		$\frac{1}{2}$ kreisförmig, schneidender Nadelkörper mit Lanzettspitze $\frac{1}{2}$ circle, cutting needle with lancet point
DSX		$\frac{1}{2}$ kreisförmig, schneidender Nadelkörper (extra starke Nadel) $\frac{1}{2}$ circle, reverse cutting needle (extra strong needle)	HSM		$\frac{1}{2}$ kreisförmig, schneidender Nadelkörper mit Mikrospitze $\frac{1}{2}$ circle, reverse cutting needle with micro point
FR		$\frac{1}{2}$ kreisförmig, Rundkörpernadel $\frac{1}{2}$ circle, round-bodied needle	HSX		$\frac{1}{2}$ kreisförmig, schneidender Nadelkörper (extra starke Nadel) $\frac{1}{2}$ circle, reverse cutting needle (extra strong needle)
FRN		$\frac{1}{2}$ kreisförmig, Rundkörpernadel, stumpf $\frac{1}{2}$ circle, round-bodied needle, blunt	KS		Kuffennadel, schneidender Nadelkörper semi-curved, reverse cutting needle
FRX		$\frac{1}{2}$ kreisförmig, Rundkörpernadel (extra starke Nadel) $\frac{1}{2}$ circle, round-bodied needle, (extra strong needle)	LR		Löffelnadel, Rundkörpernadel spoon-shaped, round-bodied needle
			VSP		$\frac{1}{2}$ kreisförmig, Spatelnadel $\frac{1}{2}$ circle, spatula needle

Needles – variants II

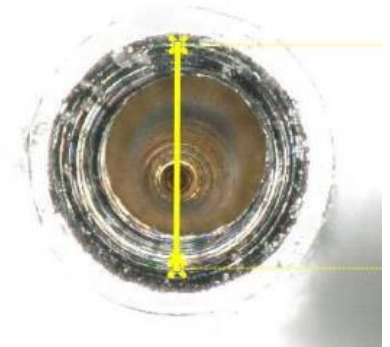
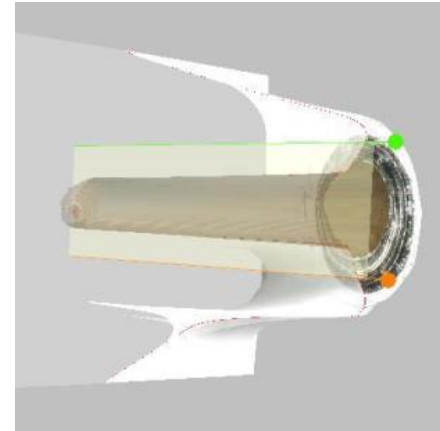
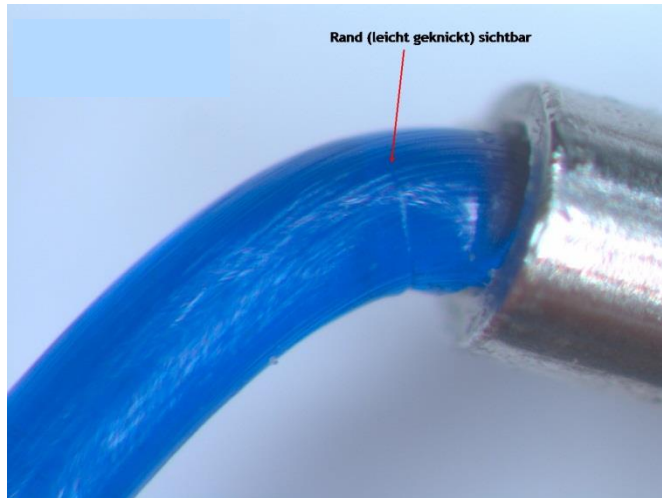


Needles – shape



Geometry tip
Cross section tip
Cross section body
Curvature
Bore hole

Needles – attachment



Customising I

Prerequisites

- Exact knowledge of customer demands
- Medicinal indication
- Utilization
- Problem

Helpful

- Indication / estimation of quantity
- Competitors / current competitor
- Asking price idea
- New and / or promising technology
- Trendsetter / expert
- Other customers

Customising II

Solution:

The screenshot displays the SERAG-WIESSNER website. The header features the company logo, navigation links (COMPANY, PRODUCTS, SERVICE, CONTACT), and an 'ORDER ONLINE' button. The main content area is titled 'INNOVATION AND TRADITION' and includes a paragraph about the company's 150-year history and a photograph of the factory building. Below this, a row of four images shows various manufacturing processes. The 'FUTURE-ORIENTATED' section follows, with text about the company's expertise and a list of 'COMPANY FACTS AND FIGURES'.

150 YEARS SERAG-WIESSNER
COMPANY PRODUCTS SERVICE CONTACT ORDER ONLINE

SERAG-WIESSNER About SERAG-WIESSNER Search

INNOVATION AND TRADITION

SERAG-WIESSNER is a medium-sized company that is family-owned and managed. We can now look back on a successful company history of 150 years.

Our decisions and developments are determined by continuity and long-term future orientation. This forward thinking has resulted in customer and supplier relations that have been sustained over many decades, as well as the development of new business areas. The two hundred highly qualified and experienced workers at our plant in Naila, northern Bavaria, make a decisive contribution to our success.

FUTURE-ORIENTATED

As the oldest German manufacturer of surgical suture materials, SERAG-WIESSNER combines many decades of experience with the latest medical know-how.

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COMPANY FACTS AND FIGURES

- ✓ more than 2000 m² cleanroom
- ✓ family-owned and managed company
- ✓ 200 highly qualified and motivated employees

SERAG-WIESSNER + heart surgery

150
JAHRE
1866 - 2016



SERAG
WIESSNER

