NeoCor

INSTRUCTIONS FOR USE

KemPeriplas-Neo Xenopericardial Patch

with Technical Specification (TU) 9444-007-57628698-2007 (the Patch)

Sterile components: KemPeriplas-Neo patch

Non-sterile components: exterior of individual storage container

Symbol	Definition	Symbol	Definition
	Consult Instructions for Use		Do not reuse
	Sterilized using aseptic processing techniques		Do not use if package is damaged
	Catalog number		Use by date
	Caution! Consult Instructions for Use		Temperature range
	Manufacturer		Serial number
	Sterilized by liquid chemical sterilant		Do not resterilize
	Treated with sodium hydroxide		

DESCRIPTION

The KemPeriplas-Neo patch is a biological tissue derived from bovine pericardium. Ethylene glycol diglycidyl ether is used in cross-linking of pericardium. Anti-prion treatment of the pericardium is performed with 1 molar sodium hydroxide for 60–75 minutes at 20–25°C. The patches are sterilized with a liquid chemical agent: 1% chlorhexidine.

The KemPeriplas-Neo patch is supplied sterile. It undergoes anticalcification treatment. The patch is stored in a 0.3% paraben mix solution.

Patch modifications:

Size, mm	Catalog number 
8x70	KPa870R
10x70	KPa1070R
10x120	KPa10120S
20x20	KPi2020S(M)
30x30	KPi3030S(M)
30x60	KPi3060S(M)
40x60	KPi4060S(M)
50x60	KPi5060S(M)
60x70	KPi6070S(M)
70x80	KPi7080S(M)
30x120	KPi30120S(M)
100x100	KPi100100T(S)
Other sizes	Customized

The scope of delivery includes:

Component	Quantity, pcs
KemPeriplas-Neo patch	1
Individual container filled with storage solution	1
Instructions for use	1
Implantation registration form	1
Identification stickers	2
Carton	1
Carton insert	2

INDICATIONS FOR USE

Use in Cardiac Surgery

The KemPeriplas-Neo xenopericardial patch is used in cardiac surgery as a plastic material to make intracardiac patches in the setting of:

— atrial and ventricular septal defects (ASD, VSD)
— tetralogy of Fallot (TOF)
— transposition of the great arteries with VSD/intact ventricular septum (TGA with VSD/IVS)
— corrected transposition of the great arteries (CTGA)
— partial/total anomalous pulmonary venous return (PAPVR/TAPVR)
— pulmonary atresia with VSD (PA with VSD)
— Ebstein's anomaly
— single ventricle defect
— atrioventricular septal defect (AVSD)
— coarctation of the aorta (CoA), interrupted aortic arch + VSD
— manufacture of monoleaflets and valve-containing conduits.

Use in Vascular Surgery

The KemPeriplas-Neo patch is used in vascular surgery for reconstruction and repair of peripheral vessels, including carotid endarterectomy:

— reconstruction of the portal vein and superior mesenteric vein
— reconstruction of renal, tibial, superficial femoral, and common iliac arteries
— repair of annular canals (annuloplasty)
— mitral valve annuloplasty
— tricuspid valve annuloplasty.

CONTRAINDICATIONS

None known. Determined by a physician in each individual case.
Do not use the patch for any purposes not specified herein.

RESULTS OF CLINICAL USE

Bovine pericardial patches preserved with ethylene glycol diglycidyl ether have been used in surgical practice since 1993.

Over 39,000 KemPeriplas-Neo patches designed for use in cardiovascular and vascular surgery were implanted in Russian clinics from 2008 to 2018. There were no reports from the clinics about any implant-induced complications during the above period.

The KemPeriplas-Neo patch is used to manufacture leaflets of the UniLine and TiAra heart valve prostheses. Studies show freedom from structural degeneration of the valve leaflet tissue within 7 years [8].

The KemPeriplas-Neo patch is used to make conduits as a part of the Ross procedure in adults [7]. Among the conduits, a xenopericardial conduit is an alternative to an allograft in the immediate and long-term periods. The use of pulmonary allografts and xenopericardial conduits revealed no significant differences as for the most dangerous complications in the short and long term ($p > 0.05$). In the long-term, the survival rate among the studied groups did not differ significantly ($p > 0.05$). Conduits made of the KemPeriplas-Neo patches show the best freedom from dysfunction after 5 years: 97.8% ($p = 0.034$) among the xenopericardial conduits. Pulmonary allografts demonstrate the best freedom from dysfunction after 5 years: 99.8%.

The results of the patch clinical use in cardiac surgery were published in 2019. The purpose of the study was to determine the long-term safety and efficacy of the KemPeriplas-Neo patch in patients who underwent isolated correction of ventricular septal defect (VSD) [9]. A single-center retrospective study included 42 patients aged 0 to 18 years diagnosed with isolated VSD (membranous and muscular), who underwent open definitive repair from 2005 to 2007 at the Research Institute for Complex Issues of Cardiovascular Diseases, Kemerovo, Russia. Exclusion criteria comprised combined congenital heart disease, congenital/acquired valvular heart disease developed either prior to or after VSD correction. In the long-term period, the patch condition (development of pseudoaneurysms, fibrosis, recanalization, calcification) was assessed by transthoracic echocardiography (TTE) and multi-slice spiral computed tomography (MSCT). In addition, calcification (expansion of calcium residues from the patch to adjacent structures including aortic complex) was assessed. Calcification could be the cause of aortic and/or tricuspid/mitral valve dysfunction.

Results

The mean age of patients at the time of surgery was 72.1 ± 2.8 (12–288) months and 17.4 ± 4.5 (13–32) years at the time of the study. The mean value in the long-term follow-up period was 132 ± 20.6 (89–162) months. The instrumental data (TTE, MSCT) suggested no signs of recurrence of VSD, calcification, fibrosis, or pseudoaneurysms. The heart valve function and chamber status had no negative changes over time since the patient's discharge. No cases of reinterventions and deaths were reported in the long-term period [9].

Conclusion

The obtained data show the safety and efficacy of the KemPeriplas-Neo epoxy-treated patch in the position of VSD. The use of the patch in children under 18 does not lead to the above adverse events in the long-term postoperative period and does not deteriorate the biomechanical properties of the interventricular septum of the growing heart, which could adversely affect the function of the adjacent structures, including the aortic complex and tricuspid valve [9].

The results of the patch clinical use in vascular surgery were published in 2007 [1]. The study included 127 patients who underwent reconstructive interventions in the extracranial segments of the carotid arteries from 1999 to 2004. All the patients were examined in the following periods: before surgery, within 5–15 days after surgery (9.0 ± 3.2 days), and 1–7 years after surgery (55 ± 4.3 months). The population was randomly divided into two groups. The first group consisted of the patients who received an autogenous vein patch as a repair material ($n = 21$). In patients of the second group, xenopericardium treated with ethylene glycol diglycidyl ether ($n = 106$) was used as a patch. Summarized surgery results for the entire period are shown in the table below.

Clinical and Performance Results of Carotid Endarterectomy (CEA)

Sign	Repair material	
	Xenopericardium	Autogenous vein
Death	0	0
Stroke	2 (1.8%)	1 (5.5%)
Transient ischemic attacks (TIA)	1 (0.9%)	0
Cranial nerve disorder (CND)	11 (10.3%)	2 (9.5%)
Thrombosis	3 (2.1%)	1 (4.7%)
Intimal hyperplasia	8 (7.5%)	9 (42.8%)
Effective lumen	4.6 mm	4.2 mm
Atherosclerotic plaques	9 (8.4%)	2 (9.5%)
Aneurysmal dilatation	0	1 (4.7%)
Linear velocity of blood flow (LVBF)	0.44–0.89 m/s	0.42–0.93 m/s
Restenosis	0	0

Conclusions

1) Xenopericardium treated with ethylene glycol diglycidyl ether is not more thrombogenic than an autogenous vein.
2) Evaluation of the xenopericardial patch functional status in the long-term period proves its enhanced feasibility for use as a patch enlargement, as it ensures effective support for arterial lumen for a long time. The patch neither affects the surgical site nor induces restenotic changes of thrombotic or atherosclerotic nature.
3) Autogenous vein material used as a patch enlargement after CEA has no advantages over a xenopericardial patch treated with ethylene glycol diglycidyl ether.

ADVERSE EVENTS

Just like any surgical procedure, it can entail adverse effects that include but are not limited to infection, rejection, erosion, and allergic reactions.

The practice of using bovine pericardium in heart valve bioprostheses included cases of mechanical destruction of the leaflets and mineralization, which sometimes caused early dysfunction of the prosthesis.

Bovine pericardium can be exposed to accelerated calcification in patients with fast calcium metabolism (e.g., children). This is not a disadvantage when the patch is exposed to systolic pressure.

The practice of using bovine pericardium for pericardial reconstruction included inflammatory epicardial reactions and adhesions between the bovine pericardium and the heart. Pericardial adhesions can complicate resternotomy.

Calcification, inflammation, and formation of fibrous tissue hindering pulmonary venous outflow were observed in patients with simple transposition of the great arteries corrected using bovine pericardium to elongate the pulmonary vein.

Based on animal studies of pericardium reconstruction, the bovine pericardium may be exposed to calcification. Animal studies showed histological signs of deterioration in the tissue structure of the implanted bovine pericardium. The results include active phagocytosis accompanied by a chronic inflammatory infiltrate and large infiltrate masses at the interface between the bovine pericardium and surrounding tissues of the recipient (with focal degradation of the implant collagen fibers) due to the patient's immune response.

The incidence of adverse events in the recipient (calcification, infection, rejection, adhesions, and hematological compatibility) has not been investigated in hernioplasty and peripheral artery reconstructions.

WARNINGS

- For single use only.
- Do not resterilize the patch by any method.

Do not use the device if:

- the shelf life has expired;
- the temperature indicator has changed its color, or if the valve has been improperly stored in temperature conditions outside the range of +5°C to +40°C;
- the tamper-evident film of the individual storage container is broken, damaged, or missing;
- fluid is leaking from the container;
- the storage solution does not completely cover the patch;
- the patch sterility has been compromised, the patch has been damaged, or if there are any other defects;

- Maintenance and repair of the patch are not provided for by the manufacturer and not required for its intended use.
- Preimplantation rinsing must be carried out in accordance with the instructions. Otherwise, the patch use could lead to inflammatory reactions in the patient's tissues.
- Do not pour the solution from the container into the rinsing basin.
- Do not expose the patch to any chemicals or substances other than those specified herein to avoid damage to the patch.
- Dispose of any unused parts of the patch in the same way as medical and biohazardous waste.

There are no special risks related to the disposal of the KemPeriplas-Neo patches.

Failure to follow these warnings may result in surgical infection.

• Complete heart block and complete right bundle branch block have been reported for procedures involving cardiac repair near the arterial-ventricular conduction bundles, most notably for repair for atrial septal defects.
• The experience of using bovine pericardium in heart valve prostheses shows that chemically cross-linked animal tissue can be exposed to late immune attack by the body and subsequent structural destruction.
• The benefits of using bovine pericardium in cardiovascular surgery or correction of soft tissue deficiencies must be weighed against the potential risks such as aneurysms, hemorrhage, or weakening of the implant tissue.

INSTRUCTIONS FOR USE

I. Patch Removal from the Carton

The KemPeriplas-Neo patch is supplied in an individual storage container protected with a tamper-evident film. The contents of the individual storage container are sterile, while the individual storage container itself must be aseptically processed before its placement in the sterile field to prevent contamination.

1.

Precautions

• Do not place the non-sterile individual storage container in the sterile field.
• Examine the temperature indicator. Do not use the patch if the temperature indicator has changed its color.
• Examine the container and carton. Do not use the patch if there are signs of moisture or leakage.

1. The surgeon is responsible for choosing the patch size.
2. After removing the individual storage container from the carton, examine it for damage.

WARNING: Do not implant the patch if the tamper-evident film of the individual storage container is broken, damaged, or missing, or if fluid is leaking from the container.
WARNING: Do not implant the patch if the storage solution does not completely cover it.

3. Check the patch size and shelf life on the label.
4. Peel off the tamper-evident film and unscrew the cap to remove the patch from the individual storage container.

CAUTION: Avoid prolonged skin contact with the storage solution. Immediately after contact, thoroughly flush any skin exposed to the solution with water. In case of eye contact, flush your eyes with water and seek appropriate medical care.

II. Removal from the Individual Storage Container

1. Using sterile atraumatic forceps, grasp the edge of the patch and remove it from the container in the aseptic field.

CAUTION: Do not use unprotected forceps or sharp instruments, since they may cause structural damage to the patch tissue.

CAUTION: Rinse powdered surgical gloves to remove powder from the gloves before touching the patch.

2. Check the patch for damage.
DO NOT implant the valve if there are any signs of damage or defects.
Do not attempt to eliminate any defects of the patch on your own.

III. Rinse Procedure

Precautions

• Do not expose the patch to media other than the storage solution in which it is supplied by the manufacturer.
• Use sterile saline to rinse the patch and irrigate it.
• Do not add antibiotics to either the storage solution or the rinse solution.
• Do not apply antibiotics to the patch.

CAUTION: Do not implant the KemPeriplas-Neo patch without thorough rinsing.

1. Prepare two basins in the sterile field and fill each of them with a minimum of 500 mL of sterile saline.
2. Using atraumatic forceps, fully immerse the patch in the sterile saline in the first basin.
3. Rinse the patch for 2 minutes, using gentle back-and-forth motions.
4. Repeat steps 2 and 3 in the remaining basin.
5. After rinsing, leave the patch immersed in the second basin until required by the surgeon for implantation.

CAUTION: Do not allow the patch tissue to dry. Place the patch in saline immediately upon removal from the storage solution. Periodically irrigate the patch with saline during implantation.

IV. Surgical Guidelines

Precautions

• Take precautions during suturing to avoid laceration of the patch tissue. If a patch is damaged, it must be replaced.
To use a patch in intracardiac procedures and in large vessel surgery, the surgeon must have expertise in cardiovascular surgery. The complexity of the surgical procedure with a patch leaves the choice of the implantation technique, as well as pre- and postoperative treatment to the surgeon's discretion with account hereof.
1. The patch shape can be changed by the surgeon using sterile scissors during surgery. Dispose of any unused parts of the patch in the same way as medical and biohazardous waste. Do not resterilize the patch.
2. Visually inspect both sides of the patch. One side is smoother. Implant the smoother side facing the blood flow surface.
3. The patch can be sutured, cut, or stapled to the edge of the patient's tissue.
4. When implanting by suture, suture bites should be taken 2 to 3 millimeters from the edge of the patch material.
5. The patch should be fixed in place carefully to obtain best results.
6. Implantation methods for the correction of atrial and ventricular septal defects coincide with the techniques described in the literature [6].
7. Use of the patch in annulus repair is similar to the techniques described in the literature for annulus repair using autologous pericardium [2, 4].
8. The patch is successfully applied if exposed to peak systolic pressure (e.g., ventricular septal defect, ventricular aneurysm, and aortic graft suture line buttress) using two techniques: a single patch or reinforced patch. The single patch technique is used to repair post-infarction VSD [5]. The reinforced patch technique is described in the literature [3, 5] and was used for ventricular aneurysm repair, ventricular septal defect patching, and aortic graft suture line buttressing.

PATIENT REGISTRATION

Each patch is supplied with an implantation registration form, a label to be inserted in the medical record, and an envelope to send back to the manufacturer.
Please fill in the implantation registration form and return it to NeoCor CJSC after implantation.
Manufacturer’s control is compulsory in some countries. Disregard any request for patient information if it contradicts the local statutory or regulatory requirements regarding patients' personal data.

POSTOPERATIVE CARE

To be established by the attending physician depending on the scope of application of the patch.

RECOMMENDATIONS FOR COUNSELING

To be established by the attending physician depending on the scope of application of the patch.

STORAGE, TRANSPORTATION, AND DISPOSAL

The patch is stored in an individual storage container filled with a 0.3% paraben mix solution. Store the container upright.
The KemPeriplas-Neo patch packed in a shipping container is carried in covered vehicles at +5°C to +40°C by any means of transportation. The carton contains a temperature indicator triggered (color change) by the inappropriate temperature of shipping or storage.
Used patches may be handled and disposed of as medical waste and biohazardous materials. There are no special risks related to the disposal of the KemPeriplas-Neo patches.

WARRANTY

NeoCor CJSC warrants that the KemPeriplas-Neo patch meets Technical Specifications (TU) 9444-007-57628698-2007 subject to compliance with these instructions and conditions of use, transportation, and storage. THIS WARRANTY EXCLUDES ALL OTHER WARRANTIES NOT EXPRESSLY STATED HEREIN, EXPRESSED OR IMPLIED BY LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR INTENDED USE since processing, storing, rinsing, and sterilizing this device as well as factors related to the patient, diagnostics, treatment, surgical procedure, and other issues beyond the control of NeoCor CJSC directly affect the product and results of its use. NeoCor CJSC IS NOT LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL LOSSES, DAMAGE, OR EXPENSES, directly or indirectly arising from the device use, other than its replacement, in full or in part. NeoCor CJSC does not undertake and does not authorize any other party to undertake any other additional obligations with regard to this device.
This limited warranty provides you with certain legal rights and you may have other rights that vary from one jurisdiction to another.
The specifications contained in documents of NeoCor CJSC are intended solely for general description of the product in the process of manufacturing and do not provide any further warranties.

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