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Case Report / Приказ случаја

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Коришћење васкуларног графта *CorMatrix ECM*® за реконструкцију каротидних артерија у лечењу постоперативне инфекције ране

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The usage of a vascular patch CorMatrix ECM® for reconstruction of carotid arteries in the treatment of postoperative wound infection

Коришћење васкуларног графта *CorMatrix ECM®* за реконструкцију каротидних артерија у лечењу постоперативне инфекције ране

SUMMARY

Introduction Operation site infection after carotid endarterectomy is a rare but potentially fatal complication.

The aim of this paper was to present two cases of using CorMatrix ECM® patch for reconstruction of a damaged artery in the course of an operation site infection.

Case outline In these patients after carotid endarterectomy there was an infection and pseudoaneurysm formation; one of them ruptured, causing massive hemorrhage. In all cases carotid artery was reconstructed using CorMatrix ECM® patch resulting in resolution of infection and healing of postoperative wounds with maintained complete patency of carotid arteries.

Conclusion The vascular patch of the extracellular matrix CorMatrix ECM® enables successful and safe angioplasty of an artery.

Keywords: operation site infection; carotid endarterectomy; artery reconstruction

САЖЕТАК

Увод Инфекција оперативног места након каротидне ендартеректомије је ретка али потенцијално фатална компликација.

Циљ овог рада је био да прикаже успешну примену *CorMatrix ECM® patch* код два болесника за реконструкцију оштећених артерија услед инфекције.

Приказ болесника Код два болесника након каротидне ендартеректомије дошло је до инфекције и формирања псеудоануризме (код једног са руптуром и масивним крварењем). У оба случаја каротидна артерија је реконструисана помоћу *CorMatrix ECM® patch* са зарастањем ране без инфекције и пуним протоком кроз каротидне артерије.

Закључак *CorMatrix ECM® patch* омогућава успешну и сигурну ангиопластику артерије.

Кључне речи: инфекција оперативног места; каротидна ендартеректомија; реконструкција артерија

INTRODUCTION

Postoperative wound infection in patients who underwent carotid endarterectomy is a rare but severe and potentially fatal complication. Risk of infectious complications in this group of patients is higher after carotid endarterectomy with prosthetic patch closure (ePTFE, polyester). There is a need for effective methods of management and treatment of infectious complications of vascular surgery procedures. A vascular patch of biological material, CorMatrix ECM®, was used to close the carotid artery in the infected operation site.

REPORT OF CASES

First Case

A 67-year old patient with a history of bilateral carotid endarterectomy, ischemic heart disease, hypertension and type 2 diabetes mellitus, was admitted to the Department of Vascular Surgery due to exacerbation of chronic ischemia of the right lower extremity with accompanying resting pain, without trophic changes in the extremity. Thrombectomy of the right popliteal artery was performed, achieving marked improvement of blood supply. Four months earlier the patient had undergone right carotid endarterectomy. On admission to the Department, purulent discharge from the lower pole of the postoperative neck wound on the right side was noted (Figure 1).



Figure 1. Purulent fistula in the lower pole of the postoperative wound.

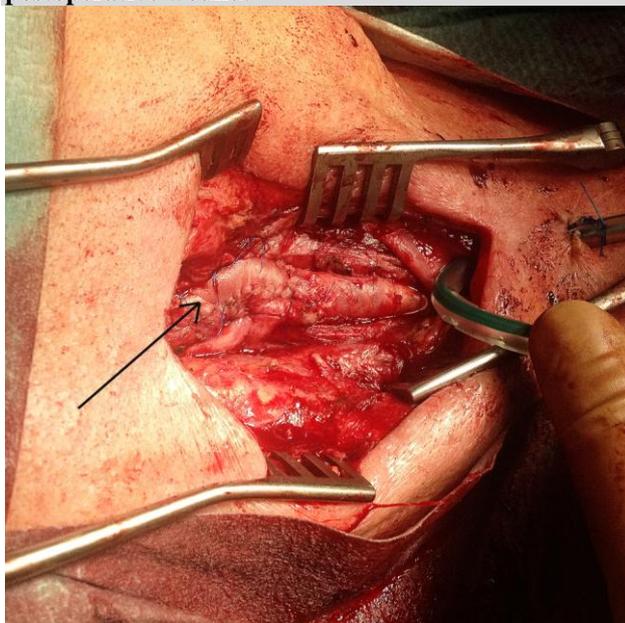


Figure 2. Status following angioplasty of the bifurcation of the right common carotid artery.

The history indicated that impaired wound healing and recurrent mild fever persisted for the past three months. Since admission to the Department the patient was not consulted by a surgeon in relation to this issue; he did not attend a scheduled follow-up visit after restoration of patency of carotid arteries. Angio-computed tomography of the brain supplying arteries was performed that revealed bilaterally normal patency of the operated carotid arteries and a deep cutaneous fistula, reaching the bifurcation of the right common carotid artery, destruction of adjacent soft tissues and signs of pseudoaneurysm. Methicillin-susceptible staphylococcus aureus (MSSA) was cultured from the wound material. Initial treatment, targeted antibiotic therapy - cloxacillin - was started as well dressing treatment, resulting in gradual improvement of general and local condition. Due to bloody stain of the wound discharge, the patient was qualified to an expedited

surgical treatment. The procedure was performed under general anesthesia. Intraoperatively advanced purulent changes of soft tissues and leaking vascular patch were found. The procedure was performed using a temporary shunt. The infected vascular patch was completely excised, the external carotid artery was underpinned and arterial margins were refreshed. The defect in the arterial wall was managed with a vascular patch CorMatrix ECM® (Figure 2).

The perioperative and postoperative period were uneventful, without acute neurological deficits. In the postoperative period targeted antibiotic therapy was maintained, normal postoperative wound healing was observed over the subsequent days, inflammatory parameters were normalized and the fever subsided. The patient was discharged home in good general and local condition, without neurological deficits and continuation of targeted antibiotic therapy was recommended.

Second Case

A 62-year old patient with hypertension and type 2 diabetes mellitus, fifteen days after the carotid endarterectomy with primary suture on the left side, was admitted to the Department in an emergency setting due to hemorrhage from the postoperative wound. The patient reported a mass at

the site of the postoperative wound that enlarged over the past few days and increasing difficulties with respiration and swallowing. On admission she did not demonstrate any acute neurological deficits. The patient underwent emergency surgical treatment and intraoperatively massive wound purulent changes and a ruptured pseudoaneurysm at the site of dehiscence of the carotid arteriotomy were found. Secondary suture was placed, resulting in satisfactory hemostasis and complete patency of operated arteries. After the procedure the patient was in good general condition, without neurological deficits. On day one after the procedure, signs of ischemia of the left cerebral hemisphere occurred - right partial hemiparesis. US Doppler imaging revealed thrombosis of the left internal carotid artery. The patient was reoperated in an emergency setting. Thrombectomy of the left carotid arteries was performed, resulting in pulsating inflow and satisfactory retrograde outflow. After implantation of a temporary shunt, angioplasty with a vascular patch CorMatrix ECM® was performed. Further treatment included empiric antibiotic therapy and subsequently targeted antibiotic therapy according to results of the culture. complete healing of the postoperative wound was achieved with complete patency of carotid arteries. Gradual resolution of neurological deficits was observed after the surgery and the patient was discharged home in good general and local condition.

In both cases no infection recurrence was found during 6-month follow-up. US Doppler imaging of brain supplying arteries revealed complete restoration of walls of carotid arteries on the CorMatrix® matrix without any evidence of restenosis (Figure 3 and 4).

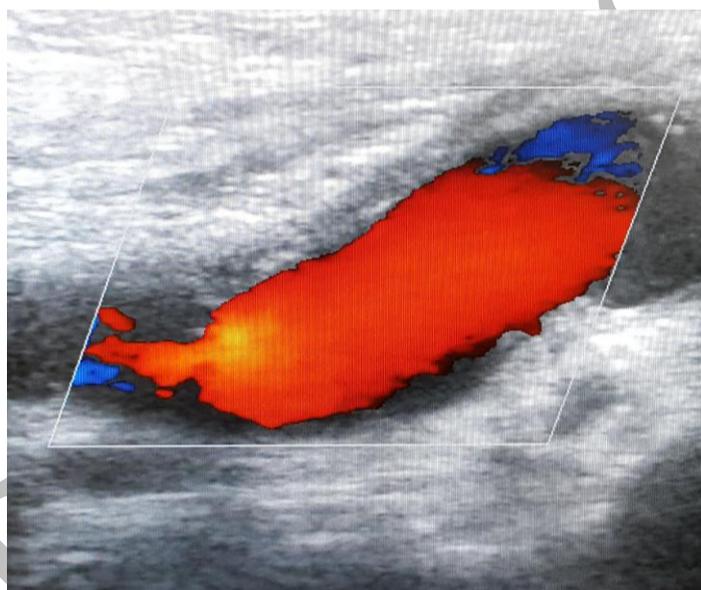


Figure 3. A follow-up US imaging 6 months after the reoperation. Complete remodeling of the CorMatrix patch with preserved complete patency of the artery at the site of its implantation.



Figure 4. Completely healed wound after the reoperation through primary intention, without any evidence of infection.

DISCUSSION

Guidelines of international scientific societies currently recommend endarterectomy of the internal carotid artery using a vascular patch due to lower risk of restenosis and early occlusion than with primary suture [1]. The risk of infection of the operation site in this group of patients is 0.5–1%

[2, 3]. The most common infecting pathogens are staphylococci and streptococci (91%) [3]. Vascular patches of Dacron® versus that of ePTFE are less resistant to infection and are more common cause of re-infections [4]. First signs and symptoms of an infection of the operation site most commonly occur within the first 30 days after the procedure, however long-term complications were reported after as many as 18 months [3]. The most common signs and symptoms include neck edema, redness and cutaneous fistula, less commonly signs of generalized infection, hemorrhage or neurological deficits. Due to large number of performed carotid endarterectomy procedures, effective methods of treatment of infectious complications must be provided. Therapeutic strategies involve medical treatment, excision of the prosthetic vascular patch and repeated angioplasty using a venous or biological patch. In the reported clinical case, due to large defect of the wall of the carotid artery and severe local infection, a decision was taken to use biological material, CorMatrix ECM®. This is extracellular matrix obtained from submucosa of the porcine small intestine. It contains mainly type I, III, IV, V and VI collagen (92% of dry weight) and glycosaminoglycans, glycoproteins, proteoglycans and growth factors. It forms an acellular scaffold enabling tissue repair by patient's own cells and its remodeling typical for the tissues of the implantation site. The period between implantation and generation of a fully differentiated patient's own tissue is 4-8 weeks [5]. CorMatrix ECM® is currently utilized in cardiac surgery, for reconstruction of the pericardium, myocardium and in vascular surgery for repair of peripheral arteries. As compared to ePTFE/Dacron®, matrices of submucosa of the porcine small intestine are resistant to bacterial colonization and furthermore they stimulate local immune response through adequate neointimal response to infection [6].

Patient undergoing carotid endarterectomy should undergo regular follow-up both for restenosis and infectious complications. If the postoperative wound becomes infected, the patient must be hospitalized and rational antibiotic therapy must be initiated and the wound must be managed surgically. The prosthetic material must be completely excised and repeated angioplasty of the vessel must be performed using biological material. The vascular patch of the extracellular matrix CorMatrix ECM® enables successful and safe angioplasty of an artery to be performed in an infected operation site.

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