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Treating hemodialysis prosthetic graft outflow stenosis with stent grafts versus balloon angioplasty

Hsuan-Tzu Yang[*1], Sheng-Yueh Yu[1], Ta-Wei Su[1], Tsung-Chi Kao[1], Hung-Chang Hsieh[1], Wen-Cheng Wei[1], Chun-Hsien Hsin[1], Po-Jen Ko[1]

[1]Cardiovascular surgery, Chang Gung Memorial Hospital, Linko, Taiwan, Republic of China

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Introduction: Vascular access is the lifeline for chronic hemodialysis patient. Although autogenous arteriovenous fistula is the most favorable type of access, some patients must rely on artificial grafts because of multiple factors, such as advanced age[1].
Complications of dialysis grafts, such as graft outflow stenosis, graft thrombosis, and infections, are relentless problems haunted every vascular access. Prosthetic graft outflow stenosis is, among all, the Achilles heel of graft complications that may lead to thrombosis unless it's properly managed[2]. Balloon angioplasty is currently the first-line treatment in the endovascular era. However, frequent and swift restenosis remains its main problem.
Plain balloon angioplasty treatment provides a satisfactory early result, however, the midterm and long-term durability of the treatment are less optimistic[3]. Access physicians are still searching endovascular treatment with lower recurrence rate.

Methods: This prospective randomized study recruited patients with symptomatic hemodialysis graft outflow stenosis into two separate treatment groups, one with conventional angioplasty, the other with stentgraft implant and followed them for at least 1.5 years to examine the clinical results.
Vascular access was established using the angio sheath without any systemic heparinization. After diagnostic angiography, the outflow lesion was defined. For the control group, angioplasty balloon was used to dilate the lesion. Repeated dilatation was applied if further stenosis seen. For the experimental group, the lesion first dilated with angioplasty balloon then a covered stent was then deployed at the lesion site.

Results: 98 patients (71 women and 27 men with a mean age of 64.54 ± 12.85 years) with ePTFE graft outflow lesions were randomized into 2 groups. All dialysis grafts used were 6mm ePTFE grafts and no heparin bonded graft used. The mean target lesion length was 4.01 ± 4.04 cm. The mean percentage of angiographical stenosis was 70% ± 11%. Most were old grafts, with a mean age of 47.81 ± 75.45 months. The mean duration from prior intervention was 7.52 ± 10.10 months.
No statistically significant differences in all demographic data between the two groups.
Most of the graft drainage vein were axillary veins. The mean diameter and length of the stent graft were 7.02 ± 0.75 mm and 69.39 ± 26.6 mm, respectively.
The technical success rate was 88.78%. No major intraoperative complications or adverse event were seen during outpatient clinic follow-up periods seen over the two groups.
The post intervention angiography of stent graft versus balloon group in terms of average restenosis rate were 9% versus 69% at 3rd month and 29% versus 72% at 6th month. The postintervention primary patency of the stent graft versus balloon groups at 3rd month, 6 th month, and 12th month were 91.7%, 83.2%, and 46.9% versus 65.3%, 27.8%, and 7.8% respectively. The mean postintervention primary patency after treatment was 380.22 ± 28.54 days for the stent graft group and 151.08 ± 16.79 days for the balloon group($p<0.0001$).

Conclusion: Hemodialysis graft outflow stenosis is the Achilles heel for hemodialysis patients using prosthetic grafts. Although balloon angioplasty remains the most commonly used treatment for those lesions, stent graft implantation seems to be an effective and promising solution which leads to a better midterm result than traditional balloon angioplasty.

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