



应用双球囊灌注导管局部注射紫杉醇对犬冠状动脉支架内再狭窄的预防作用

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Prevention of Restenosis in the Canine Coronary Stents through Local Delivery of Paclitaxel Using the Double-balloon Perfusion Catheter

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摘要

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摘要 目的 评价应用双球囊灌注导管在犬冠状动脉内局部注射紫杉醇预防支架内再狭窄的安全性和有效性。方法 随机选取15只杂种犬作为实验组, 5只作为对照组, 选取合适的左冠状动脉作为靶血管, 制造球囊损伤模型, 然后应用双球囊灌注导管对损伤处局部注射药物, 实验组局部注射20 μmol/L紫杉醇10 ml, 对照组局部注射生理盐水10 ml, 灌注时间为(26.45±5.18)s, 然后在靶血管段植入3.0 mm×8 mm的316L不锈钢金属裸支架。3个月后行冠状动脉造影复查、冠状动脉内光学相干断层成像(OCT)、组织学检查, 测量两组靶血管支架内最窄处的新生内膜厚度、残余管腔面积、新生内膜面积、支架面积、外弹力膜面积和狭窄程度。结果 冠状动脉造影复查结果显示对照组再狭窄发生率显著高于实验组, 差异有统计学意义(60%比33.33%, $P<0.05$)。冠状动脉内OCT测量结果显示实验组与对照组新生内膜厚度分别为(0.19±0.08)mm和(0.38±0.03)mm, 新生内膜面积为(1.52±0.49)mm²和(2.51±0.47)mm², 残余管腔面积为(3.50±0.66)mm²和(2.78±0.57)mm², 狭窄程度为(30.13±8.56)%和(47.40±4.50)%, 两组间差异均有统计学意义(P 均<0.05)。组织学检查结果实验组与对照组新生内膜厚度分别为(0.22±0.10)mm和(0.47±0.05)mm, 新生内膜面积为(1.85±0.78)mm²和(3.43±0.25)mm², 残余管腔面积为(3.15±0.43)mm²和(1.85±0.55)mm², 狭窄程度为(36.00±10.97)%和(65.40±8.23)%, 两组间比较差异也均有统计学意义(P 均<0.05)。两组支架均完全内皮化, 无血栓及瘤样扩张形成。结论 应用双球囊灌注导管冠状动脉内局部注射紫杉醇预防支架内再狭窄是安全有效的。

关键词: 金属裸支架 局部用药 紫杉醇 再狭窄 动物实验

Abstract: Objective To evaluate the safety and efficiency of local paclitaxel delivery using the double-balloon perfusion catheter to prevent restenosis in the canine coronary artery. Methods Twenty domestic canines underwent bare-metal stent implantation after balloon injury of the left coronary artery. A novel double-balloon perfusion catheter was used to deliver the drug locally in the canine coronary artery. In the treatment group ($n=15$), paclitaxel (10 ml, 20 μmol/L) was delivered using the double-balloon perfusion catheter before stent implantation. In the control group ($n=5$), 10 ml saline was delivered using the double-balloon perfusion catheter before stent implantation. The perfusion time in both groups was (26.45±5.18) s. Animals underwent coronary angiography and optical coherence tomography (OCT) 90 days after stent implantation and were sacrificed. Vessels were perfusion-fixed and morphometric analysis was performed using conventional techniques. Results Coronary angiography results showed restenosis rate in control group was significantly higher than that in treatment group (60% vs. 33.33%, $P<0.05$). The parameters of OCT showed in treatment group and control group: the neointimal thickness was (0.19±0.08)mm and (0.38±0.03)mm, the neointimal area was (1.52±0.49)mm² and (2.51±0.47)mm², the lumen area was (3.50±0.66)mm² and (2.78±0.57)mm², the extent of stenosis was (30.13±8.56)% and (47.40±4.50)%, and all the variances above were significantly different between the two groups ($P<0.05$). The histologic parameters showed in treatment group and control group: the neointimal thickness was (0.22±0.10)mm and (0.47±0.05)mm, the neointimal area was (1.85±0.78)mm² and (3.43±0.25)mm², the lumen area was (3.15±0.43)mm² and (1.85±0.55)mm², the extent of stenosis was (36.00±10.97)% and (65.40±8.23)%, and all the variances above were also significantly different between the two groups ($P<0.05$). The stents of both the groups were fully endothelialized. No thrombus or aneurysm was found in stents. Conclusion Local delivery of paclitaxel with the double-balloon perfusion catheter to prevent restenosis in coronary stents is safe and efficient.

Keywords: bare-metal stent local drug delivery paclitaxel restenosis animal experiment

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