The CERAB technique using covered stents is better treatment for complex aorto-iliac occlusions than bare stents: based on flow characteristics in an in-vitro flow model

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Lesions of the aortic bifurcation and Kissing Stents
- Wide range in patency results of kissing stents, but inferior compared to isolated stents in iliac artery or the aorta
- Patency affected by:
  - Radial mismatch, aortic lumen dead space
  - Differences in stent conformation
  - The overlap of the free proximal stent ends
  - Re-circulation, turbulence and stasis
  - Mesenchymal tissue, thrombus and intimal hyperplasia


Covered Endovascular Reconstruction of the Aortic Bifurcation - CERAB
Goal: to provide a more anatomical and physiological endovascular reconstruction of the aortic bifurcation, also for extensive lesions

CERAB related to:
- Lowest radial mismatch
- High conformation ratio (‘double-D’ configuration)


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**Methods**

*configurations*

- Kissing bare stents
- Kissing covered stents
- CERAB

**Results**

*inflow section limbs*

- Covered KS mismatch induces large zone of recirculation during entire cardiac cycle

**Results, flow fields at neobifurcation**

- Flow perturbation little to none at inflow of KS BM configuration

**Results**

*WSS inflow section limbs*

- Low WSS in covered KS configuration, over the entire vessel wall
- WSS values CERAB comparable to KS bare metal stents

**Results**

*inflow section CERAB cuff*

- No flow perturbations at the inflow of aortic cuff
Results

native aortic bifurcation

• Continuous zone of low flow between anatomic bifurcation and neobifurcation
• End systolic phase: recirculation at the mismatch area

Results

WSS native aortic bifurcation

• WSS control and bare metal KS configuration comparable
• WSS bare metal KS configuration at the end systolic closer to zero

Conclusion

• The CERAB configuration is related to undisturbed flow throughout the cardiac cycle
• Inflow section of limbs is disturbed in the covered KS configuration
  • Large recirculation zones when compared to CERAB
  • Low WSS throughout cardiac cycle compared to CERAB and bare metal KS
• Bare metal KS related to recirculation and slow blood flow at the native bifurcation
  • Correlated to thrombus formation and intimal hyperplasia in this zone
• This zone excluded in the CERAB configuration

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