



Reduced Antithrombin-III-Activity (AT-III-a) in Patients with Thrombus Formation after Fontan-Operation

Introduction:

There exists a considerable risk for early postoperative thrombus formation (epTF) after Fontan-operation inside the extracardiac conduit (ECC) or the pulmonary arteries (PA).

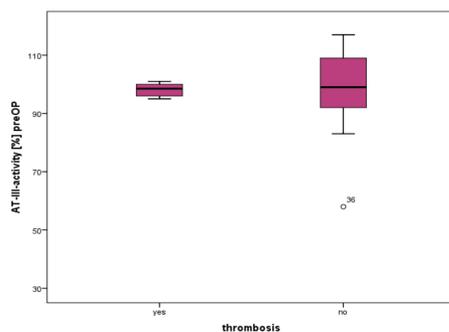
Probable reasons are low blood flow, a rough surface after surgery, but also disorders of the coagulation system are possible promotive factors. It can occur in the early postoperative period, despite anticoagulation with heparin.

Methods:

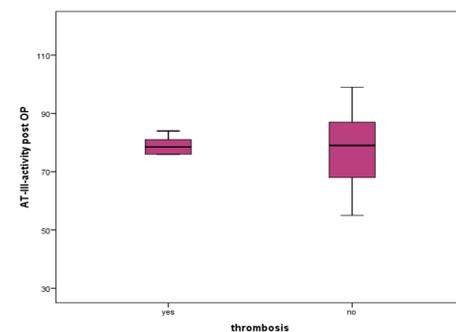
In a retrospective study we analyzed the AT-III-activity (AT-III-a) before and after Fontan-operation in n=29 consecutive patients without and n=6 with epTF during the first day after surgery.

Results:

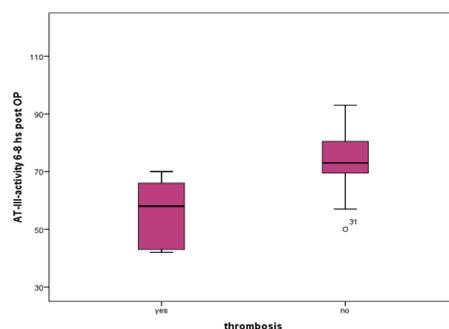
The preoperative AT-III-a was normal in both groups ($100\% \pm 11.4\%$) without any difference among both groups ($p=0.16$).



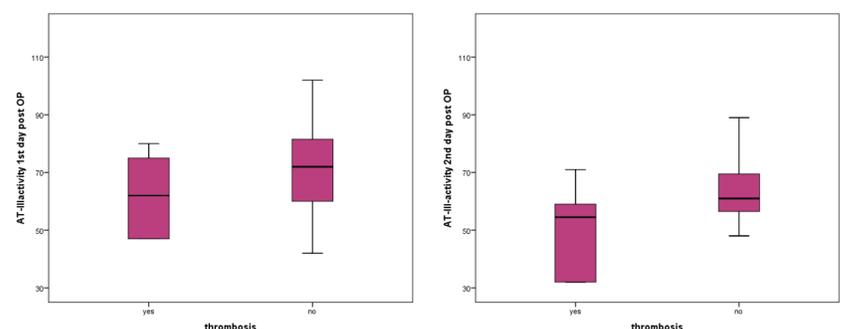
Immediately after Fontan-operation AT-III-a was slightly reduced in both groups ($77\% \pm 10\%$), again without a significant difference ($p=0,54$).



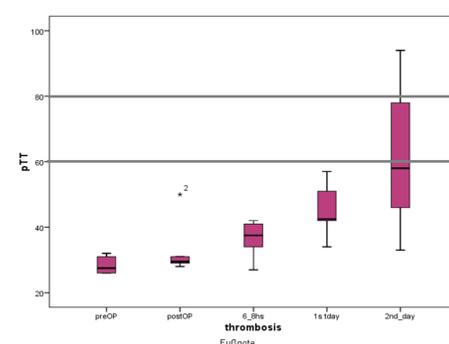
Six to eight hours after the operation we observed a major decline of AT-III-a in patients with epTF ($56,2\% \pm 10,9\%$), while it fell only marginally in patients without ($74,3 \pm 11\%$). This difference was significant ($p=0.014$).



There was also a difference among patients with and without epTF in the 1st ($62.2 \pm 12.7\%$ vs. $71.2 \pm 14.9\%$) and 2nd ($50.5 \pm 14.3\%$ vs. $64.0 \pm 10.4\%$) postoperative day, but these dissimilarities were not significant.



In all patients with epTF we failed to reach a therapeutical aPTT (60-80 sec) during the first postoperative day, despite high doses of heparin.



Conclusions:

AT-III-a is severely reduced in patients with epTF after Fontan-operation, but only slightly in patients without. Obviously this reduction plays an important role in the pathogenesis of epTF, because it is impossible to reach a therapeutical effect of heparin in the absence of AT-III.

Thus, AT-III-a has to be controlled and if needed AT-III has to be substituted, to attain a sufficient early postoperative anticoagulation.

Argatroban, which is inhibiting thrombin directly and – in contrast to heparin - independent from AT-III, may be an alternative to AT-III substitution.