Reduced antithrombin-III-activity in patients with early thrombus formation after Fontan-operation

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Introduction:
There is a major risk for thrombus formation (TF) inside the extracardiac conduit and both pulmonary arteries after Fontan-operation. It may configure in the early postoperative period, despite anticoagulation with heparin. Disorders of the coagulation system are possible promotive factors.

Methods:
In a retrospective study we analysed the AT-III-a before and after Fontan-operation in n=29 consecutive patients without and n=6 with early postoperative TF.

Results:
The preoperative AT-III-a was normal (100±11.4%) without differences among both groups (p=0.16). Immediately after operation AT-III-a decreased slightly (77±10%), again with no significant difference between the two groups (p=0.54).
Six to eight hours after the operation we observed a major decline of AT-III-activity (56.2±10.9%) in patients with TF inside, while it fell only marginally in patients without TF (74.3±11%). The difference between both groups was significant (p=0.014).
There was also a difference in AT-III-a among patients with and without TF in the morning of the 1st (62.2±12.7% vs. 71.2±14.9%) and 2nd (50.5±14.3% vs. 64.0±10.4%) postoperative day, but the dissimilarity was not significant.
In all patients with TF we could not reach a therapeutical aPTT during the first postoperative day, despite high doses of heparin.

Conclusions:
AT-III-a is reduced in some patients early after the Fontan-operation. This plays an important role in the pathogenesis of early postoperative TF inside the conduit or central pulmonary arteries. Thus, AT-III-a has to be controlled and if necessary substituted, to attain a sufficient early postoperative anticoagulation.
Because argatroban is inhibiting thrombin directly and – in contrast to heparin - independent from AT-III-a, it may be an alternative to AT-III substitution.