

Proinflammatory and antiinflammatory cytokines after cardiac operation: different cellular sources at different times

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Background

Cardiac operation produces substantial alterations within the immune system, which possibly predispose postoperative complications. However, the interplay between proinflammatory and antiinflammatory reactions and the cells involved in this process are not completely clear. Therefore, we investigated serum levels, as well as synthesis patterns, of proinflammatory and antiinflammatory cytokines.

Methods

Serum levels and production of interleukin (IL) IL-5, IL-6, IL-10, tumor necrosis factor- α , and interferon- γ , using a mixed cell culture, (ie, monocytes, macrophages, and lymphocytes), as well as a purified lymphocyte culture were measured preoperatively (day 0), on postoperative day 1, on postoperative day 3, and on postoperative day 5 in 25 patients undergoing cardiac operations and were compared with 10 healthy volunteers.

Results

Serum level and mixed cell culture, production of IL-6, tumor necrosis factor- α , and IL-10 increased on postoperative day 1, but decreased in lymphocyte culture. Base line values were reached on postoperative day 5. Interferon- γ serum levels remained unchanged, whereas IL-5 serum levels increased on postoperative days 3 and 5. Cell culture synthesis showed a significant suppression for both mediators in both cell cultures, which returned to baseline on postoperative day 3 in mixed cell culture. Interferon- γ production by lymphocytes was suppressed until postoperative day 5, whereas IL5- returned to preoperative values on postoperative day 5.

Conclusions

Cardiac operation induces a biphasic immune response. The first phase (postoperative day 1) appears to represent the proinflammatory and antiinflammatory reaction of the innate immune system returning to baseline on postoperative day 3. The second phase (postoperative day 5) may represent the response of the adaptive immune system and is characterized by an anti-inflammatory type of reaction. This may explain why the systemic inflammatory response occurs immediately after cardiac operation, whereas infections occur later.

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