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Cardiopulmonary response to reamed intramedullary nailing of the femur with a traditional reaming system and a one-step reamer-irrigator-aspirator reaming system; an experimental study in pigs

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Introduction

There is general agreement that early internal stabilization in long bone fractures in severely injured patients is advantageous. Intramedullary reaming and nailing, however, include increased intramedullary pressure. This may cause intravasation of bone marrow contents, leading to bone marrow embolisation and altered cardiopulmonary function. Possible beneficial effects of attenuation of the intramedullary pressure increase by the use of a reamer-irrigator-aspirator (RIA) system were studied with the hypothesis that the RIA technique would cause lower numbers of pulmonary embolisms and lesser cardiopulmonary affection than after traditional reaming (TR).

Methods

Intact femora in an experimental model using young Norwegian landrace pigs were carried out using a standard intramedullary nailing technique (n = 8) or RIA technique (n = 7). The hemodynamic and pulmonary effects were investigated during the reaming and nailing procedure and for 2 hours postoperatively. The animals were sacrificed after 72 hours, the lung/carcass weight ratio and the numbers of pulmonary embolisms were investigated. A control group were exposed to a sham operation with no reaming or nailing of the femoral cavity (n = 7).

Results

The pattern of the procedure related hemodynamic and pulmonary effects did not differ significantly between the RIA and the TR groups. The RIA group had lower numbers (ns) of embolisms per cm^2 lung area than the TR group. After reaming with the TR device, two animals died of pulmonary embolisms the first postoperative day. No animals died of pulmonary embolisms after reaming with the RIA system.