redilatation of stented pulmonary arteries, whereas external compression and intimal hyperplasia less often led to reintervention.[7] Redilatation is also limited by restricted maximum stent diameters.

Hatai *et al*[5] reported on the follow up of 26 children under 1 year of age who had received one or more stents. After a follow up of up to 36 months (median 12 months), 11 of these patients had successful redilatations within a median of 10 months after implantation; in 10 patients stents were surgically removed or augmented by implantation of a patch after the stented vessel was cut longitudinally. They summarised that the rate of surgical interventions after stent implantation in infancy increases significantly with an increasing follow up interval. Nevertheless, the use of stents in combination with redilatation during follow up may at least postpone surgical intervention.

Our group previously published a different approach to the problem of mismatch of maximum stent diameter and vessel growth.[8] The concept of the ''babystent'' was not pursued further because of limited radial stent stability after redilatation.

The concept of a breakable stent aims at a solution to the problem of limited adaptation of stents to vessel growth in young patients. The breakable stent can be implanted with a diameter of 5–6 mm. This is sufficient for an interventional approach to neonatal coarctation of the aorta. An introduction sheath of 4 or 5 French is needed for implantation, thus making the stent applicable to neonates. During follow up, the stent can be redilated to adopt the stent size to the growing vessel. When a diameter of 8–9 mm is achieved and vessel growth requires further enlargement, the stent can be broken open by simple redilatation with the longitudinally applied sutures serving as predetermined breaking points. Thus, the breakable stent is not limited by a maximum diameter. If needed, at this point, a larger regular peripheral stent may be implanted that has enough potential for adoption to vessel growth until adulthood.

Conclusions

In this study we showed the feasibility, effectiveness, and biocompatibility of the breakable stent in an animal model. The concept of a breakable stent combines advantages of stents of different sizes. The breakable stent requires only a small introduction sheath. It may be redilated without the limit of a maximum diameter of a regular coronary stent, since it can be broken open by means of simple angioplasty if enlargement to a diameter of more than 8–9 mm is required. In our study, the rapid body growth of the piglets served as a valuable model for the successful adoption of the breakable stent to vessel growth.

Histopathological analysis of the stents showed good biocompatibility of the device with complete cellular coverage of the stents struts, with mild intimal hyperplasia after stent implantation and a mild inflammatory reaction in the surrounding tissue. At the site of stent breakage, thinning of the vessel wall with partial rupture of the media was observed. The vessel did not rupture when a balloon catheter of adequate size was used for redilatation.

With the concept of the breakable stent, surgery because of mismatch of stent size and vessel growth during development may be avoided or at least postponed.

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