Embolization of cerebral vessels with inflatable and detachable balloons

Technical note

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The authors describe an inflatable and detachable rubber balloon for embolization of cerebral or spinal vessels.

KEY WORDS • cerebral artery occlusion • embolization • balloon occlusion

In 1974, Serbinenko published a paper on catheterization and occlusion of cerebral arteries with rubber balloons. He had used his revolutionary technique mainly for temporary occlusion of the vessels; in few cases, it seems, had he been able to detach the inflated balloon from its catheter. In 1975, Debrun, et al., described an improved version of Serbinenko's balloon catheter. A small finger-like latex rubber bag was pulled over the tip of a catheter. The neck of the bag was fitted with a thin rubber ring, which constricted the opening and was intended to occlude it when the catheter was quickly withdrawn from the inflated balloon. Apparently the closure mechanism of the neck of the balloon was not tight enough, and the x-ray contrast medium used for inflation and visualization escaped through the neck, because Debrun starting using plastic materials which harden in the balloon.

Technique

A new technique has been developed by one of us (L.L.). Its principle is shown in Fig. 1: 1) A latex rubber bag, 4 mm long and 0.6 mm wide, is dipped mouth down in rubber solution so that the neck is occluded to a length of 1 mm. 2) A stainless steel tube, 3 mm long and 0.4 mm thick with an inner diameter of 0.1 mm, is filed thin for half of its length, to

![Fig. 1. Diagram showing embolization technique using inflatable and detachable balloon catheter. See text for details.](image-url)
FIG. 2. The balloon, originally 4 mm long and 0.6 mm thick (outer diameter), can be inflated (here with tea) to a size of 5 × 8 mm. When the catheter tube is withdrawn from the balloon, the neck closes tightly by itself.

an outer diameter of about 0.2 mm. 3) The thicker end of the tube is fixed inside the tip of a Teflon or polyethylene catheter, and the thinner end is pushed through the solid neck into the balloon, which can then be inflated and deflated. 4) When the apparatus has been inserted inside a vessel, inflation fixes the balloon against the walls of the vessel. 5) The catheter-tube part can be withdrawn, and the solid rubber neck of the balloon then closes by itself. The neck is usually airtight and watertight, and is reliable for use with oil-soluble x-ray contrast media (Fig. 2).*

We have left balloons in the arteries of three goats, and their size has remained unchanged for several months (Fig. 3). Similar experiments have been carried out in pigs and rabbits at Umeå, Sweden, by Bengt Liliequist and his coworkers. The technique will soon be tried clinically.

References
3. Liliequist B: Personal communication, 1977

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*Balloon-catheters are available from Emset Oy, P.O. Box 21, 00811 Helsinki 81, Finland. Patent pending.