Extradural Transducer for Monitoring Intracranial Pressure

By

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With 6 Figures

Summary

In this paper we describe an epidural pressure-transducer which has been tested in over 200 patients. No complications were observed. The transducer has a very low drift and has virtually no temperature sensitivity.

Extradural monitoring of intracranial pressure has certain advantages over the continuous recording of ventricular fluid pressure. The main advantage is that in the epidural method the dura mater remains closed so that there is less danger of infection and of CSF leakage which can affect results. Another advantage is that there is no blocking of the hydrostatic system and no damaging of brain tissue. Often, in patients with increased intracranial pressure the ventricular system is compressed and dislocated.

In past years a number of investigators have stated that extradural devices for monitoring intracranial pressure can be perfectly accurate if proper care is taken in construction and insertion of the pressure transducer (Nornes and Serck-Hanssen 1970, Brock and Diefenthaler 1972, Coroneos et al. 1972, Dorsch and Symon 1972, Goblet et al. 1972, Majores et al. 1972, Dorsch and Symon 1975).

The requirements for an ideal intracranial pressure transducer have been selected by the national Academy of Engineering in England. These requirements are extradural positioning, no risk of infection, comfort, implantability, preferably no connecting wires, small physical size, calibration capacity from outside, stability, minimal temperature-sensitivity, imperviousness to the environment,
extended use availability from 7 to 30 days, less than 1 mm of mercury zero shift due to temperature effects and time in 24 hours, and reasonable cost.

In close cooperation with us Philips Research Laboratories and Philips Medical Systems Division developed an epidural pressure transducer. Transducers of this type have been used in monitoring more than 200 patients over a total of 9,000 hours. The transducers showed very low drift and good immunity to temperature variations.

No clinical complications were observed. This device can be placed extradurally, carries with it little risk of infection, is not uncomfortable, is implantable, and is small. It is also stable, not sensitive to temperature, imperious, very sensitive, and cheap.

In a number of patients we made simultaneous recordings of the epidural and intraventricular pressures. The correlation between the ventricular pressure and the epidural pressure was linear (Fig. 1). In some patients we saw a discrepancy between these two curves (Fig. 2). The reason for this was in our cases an obstruction of the ventricular cannula of the intraventricular device.

**The Transducer Construction**

The Philips transducer consists of a measuring element, a substrate, a stainless steel housing, and a plug with cable. The measuring