

Shunt Valve

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Device that regulates, directs or controls the **flow** of a **fluid** by opening, closing, or partially obstructing various passageways. Valves are technically valves fittings, but are usually discussed as a separate category. In an open valve, fluid flows in a direction from higher pressure to lower pressure.

Types

Programmable valve

[Adjustable differential pressure valve.](#)

Nonprogrammable valve

[Nonprogrammable valve.](#)

An analysis of the evidence did not demonstrate a clear advantage for any specific shunt component, mechanism, or valve design over another.

In the nineties, more than 30 valves have been launched, most are “clones”, but some introduce new concepts (Diamond, SiphonGuard, PaediGAV). Of the 22 designs we tested, 20 have no previous tests and 3 are low-cost valves from Mexico (Dewimed), Zimbabwe (Harare-shunt) and England (Nottingham Shunt). 27 were tested using non-stop-perfusions for 365 days, 8 for 168-294 and 3 for 2 days.

Ranking of the mean relative deviation: adjustable valves 19%, gravitational 34%, simple ball 51%, diaphragm 73%, distal slit 74% and autoregulating valves 121%. Ranking of physiological flow properties: gravitational > Equiflow > autoregulating > adjustable > ball > diaphragm > distal slit.

The Equiflow were highly susceptible to external pressure.

Most valves designed in the nineties showed inaccuracy, long-term-drifts, safety deficits and hydraulic mismanagement similar to more than 400 previously tested probes. With regard to accuracy and drift the ball designs were superior, but simple and adjustable ball valves are at risk of overdrainage. The gravitational ball valves (Cordis GCA, Miethke valves) showed the closest relation to physiological flow requirements ¹⁾.

Integra valves

see [Integra valves](#).

Medtronic valves

see [Medtronic valves](#).

Miethke valves

see [Miethke valves](#).

Parts

A **shunt valve chamber** is a component of a **ventriculoperitoneal (VP) shunt system**, used in neurosurgery to manage conditions like hydrocephalus. Here's an overview:

Key Features: 1. **Purpose:**

1. Regulates cerebrospinal fluid (CSF) flow.
2. Ensures controlled drainage from the ventricles of the brain to a distal site (commonly the peritoneal cavity).

2. **Structure:**

1. The chamber is part of the shunt valve mechanism and may contain one or more pressure-sensitive components.
2. It might include a reservoir for CSF sampling or pressure assessment.
3. Typically located subcutaneously (just under the scalp).

3. **Function:**

1. Adjusts to changes in intracranial pressure, opening or closing to maintain a proper flow rate.
2. Can be programmable, allowing adjustments to pressure settings non-invasively with an external magnetic device.
3. May feature anti-siphon devices to prevent over-drainage when the patient is upright.

4. Types of Shunt Valves:

1. **Fixed-Pressure Valves:** Operate at a predetermined pressure setting.
2. **Programmable Valves:** Allow customization of pressure settings after implantation.
3. **Gravity-Compensating Valves:** Adjust drainage rates based on the patient's position.

5. Clinical Role:

1. A critical element in preventing complications like under-drainage (leading to high intracranial pressure) or over-drainage (leading to low intracranial pressure, subdural hematomas, or slit ventricle syndrome).

Considerations in Practice: - **Imaging:** MRI compatibility is critical for programmable valves. - **Maintenance:** Regular monitoring is needed to ensure functionality and adjust settings as needed. - **Complications:** Malfunctions, infections, or obstructions in the shunt system can affect the valve's performance.

Would you like more detailed technical specifications or guidance on troubleshooting issues related to shunt valve chambers?

1)

Oikonomou J, Aschoff A, Hashemi B, Kunze S. New valves–new dangers? 22 valves (38 probes) designed in the 'nineties in ultralong-term tests (365 days)'. Eur J Pediatr Surg. 1999 Dec;9 Suppl 1:23-6. PubMed PMID: 10661786.

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