Shunt infection prevention

- Update in the Treatment of Cirrhotic Patients with Portal Vein Thrombosis
- Suboptimal Immunisations in Children With a Ventriculoperitoneal Shunt-Can We Do Better?
- Integration of continuous lumbar drainage and third-generation EGFR-TKI in managing leptomeningeal metastasis-induced life-threatening intracranial hypertension: a case report
- Severe Early-Onset Pulmonary Hypertension in a Six-Month-Old With Down Syndrome and Isolated Secundum Atrial Septal Defect
- Preventing What Matters: A Fast and Reliable Technique to Secure External Ventricular Drains and Avoid Dislodgement
- Surgeon perceptions and utilization of evidence-based medicine
- The significance of investigation into underlying coronary artery fistula in patients with tricuspid valve endocarditis: a case report
- A Rare Case of Sinus of Valsalva Aneurysm Rupture Resulting From Infective Endocarditis and Requiring Surgery

Preoperative Measures

Patient Preparation:

Screening: Assess and manage any pre-existing infections, such as skin infections or systemic conditions that could increase the risk of infection. Antibiotic Prophylaxis: Administer prophylactic antibiotics as per institutional protocols. Usually, broad-spectrum antibiotics are given before and during the procedure to minimize bacterial contamination. Surgical Team Protocols:

Sterile Technique: Ensure that all members of the surgical team adhere to strict sterile techniques, including hand hygiene, use of sterile gloves, and sterile drapes. Preparation of Surgical Site: Thoroughly clean and disinfect the surgical site using appropriate antiseptics, such as iodine-based solutions or chlorhexidine. Surgical Equipment:

Sterilization: Ensure that all surgical instruments and the shunt system are properly sterilized before use. Avoid Contamination: Handle all equipment with sterile techniques to prevent contamination during the procedure. Intraoperative Measures Minimize Duration of Surgery:

Efficiency: Perform the surgery as efficiently as possible to minimize the time the patient is exposed to potential contaminants. Antibiotic Administration:

Intraoperative Antibiotics: Administer additional doses of antibiotics if the surgery is prolonged or if there are specific concerns about infection. Shunt Placement:

Technique: Ensure that the shunt is placed correctly with minimal trauma to the tissues and avoid unnecessary manipulation. Postoperative Measures Wound Care:

Monitoring: Monitor the surgical site for signs of infection such as redness, swelling, or discharge. Dressings: Use sterile, non-stick dressings and change them as needed, following proper aseptic techniques. Patient Education: Educate the patient and caregivers on how to care for the wound and recognize signs of infection. Antibiotic Therapy:

Prolonged Use: Continue antibiotics as prescribed, especially if there was a high risk of infection or if

the patient has a compromised immune system. Follow-Up:

Regular Check-ups: Schedule regular follow-up appointments to monitor for signs of infection or complications. This includes physical examinations and possibly imaging studies to ensure proper function of the shunt. Long-Term Prevention Shunt Maintenance:

Regular Monitoring: Regularly check the function of the shunt to ensure it is working properly and not causing complications that might predispose to infection. Shunt Revision: Address any issues with the shunt promptly to avoid infection or other complications. Patient Hygiene:

Personal Hygiene: Encourage good personal hygiene, including regular hand washing and keeping the area around the shunt clean and dry. Avoid Invasive Procedures: Minimize the need for invasive procedures or maneuvers that might introduce bacteria. Education and Awareness:

Infection Prevention Training: Provide education to patients and caregivers about the importance of infection prevention, recognizing early signs of infection, and when to seek medical attention. Clinical Management Early Detection:

Symptoms Monitoring: Monitor for symptoms such as fever, irritability, vomiting, and lethargy, which might indicate an infection. Diagnostic Workup: Perform diagnostic tests such as blood cultures, cerebrospinal fluid (CSF) analysis, or imaging studies if an infection is suspected. Prompt Treatment:

Antibiotic Therapy: Initiate appropriate antibiotic therapy based on the culture and sensitivity results to treat the infection effectively. Shunt Removal or Replacement: In severe cases, the shunt may need to be removed or replaced, and additional surgical intervention may be required. Conclusion Preventing shunt infections requires a multi-faceted approach involving preoperative preparation, meticulous intraoperative techniques, vigilant postoperative care, and long-term management. By following strict hygiene practices, using prophylactic antibiotics, and ensuring regular monitoring, healthcare providers can significantly reduce the risk of infections associated with shunt systems.

A systematic review using PubMed and SCOPUS identified studies evaluating the effect of a particular intervention on shunt infection risk. Systemic prophylactic antibiotic or antibiotic-impregnated shunt efficacy studies were excluded. A total of 7429 articles were screened and 23 articles were included.

Eight studies evaluated the effect of comprehensive surgical protocols. Shunt infection was reduced in all studies (absolute risk reduction 2.2-12.3 %). Level of evidence was low (level 4 in seven studies) due to the use of historical controls. Compliance ranged from 24.6 to 74.5 %. Surgical scrub with antiseptic foam and omission of a 5 % chlorhexidine gluconate preoperative hair wash were both associated with increased shunt infection. Twelve studies evaluated the effect of a single intervention. Only antibiotic-impregnated suture, a no-shave policy, and double gloving with glove change prior to shunt handling, were associated with a significant reduction in shunt infection. In a hospital with high methicillin-resistant staphylococcus aureus (MRSA) prevalence, a randomized controlled trial found that perioperative vancomycin rather than cefazolin significantly reduced shunt infection rates.

Despite wide variation in compliance rates, the implementation of comprehensive surgical protocols reduced shunt infection in all published studies. Antibiotic-impregnated suture, a no-shave policy, double gloving with glove change prior to device manipulation, and 5 % chlorhexidine hair wash were associated with significant reductions in shunt infection [1)].

In a report by Kestle et al., 2011, compliance with an 11-step protocol was shown to reduce CSF shunt infection at Hydrocephalus Clinical Research Network (HCRN) centers (from 8.7% to 5.7%). Antibiotic impregnated catheters (AICs) were not part of the protocol but were used off protocol by some surgeons. The authors therefore began using a new protocol that included AICs in an effort to reduce the infection rate further.

The new protocol was implemented at HCRN centers on January 1, 2012, for all shunt procedures (excluding external ventricular drains [EVDs], ventricular reservoirs, and subgaleal shunts). Procedures performed up to September 30, 2013, were included (21 months). Compliance with the protocol and outcome events up to March 30, 2014, were recorded. The definition of infection was unchanged from the authors' previous report.

A total of 1935 procedures were performed on 1670 patients at 8 HCRN centers. The overall infection rate was 6.0% (95% CI 5.1%-7.2%). Procedure-specific infection rates varied (insertion 5.0%, revision 5.4%, insertion after EVD 8.3%, and insertion after treatment of infection 12.6%). Full compliance with the protocol occurred in 77% of procedures. The infection rate was 5.0% after compliant procedures and 8.7% after noncompliant procedures ($p = 0.005$). The infection rate when using this new protocol (6.0%, 95% CI 5.1%-7.2%) was similar to the infection rate observed using the authors' old protocol (5.7%, 95% CI 4.6%-7.0%).

CSF shunt procedures performed in compliance with a new infection prevention protocol at HCRN centers had a lower infection rate than noncompliant procedures. Implementation of the new protocol (including AICs) was associated with a 6.0% infection rate, similar to the infection rate of 5.7% from the authors' previously reported protocol. Based on the current data, the role of AICs compared with other infection prevention measures is unclear [2].

The combination of intraventricular gentamicin and vancomycin with systemic antibiotic therapy significantly decreased the incidence of perioperative shunt infection. It is presumed that intraventricular antibiotic therapy extends prophylactic antibiotic coverage into the CSF and prevents bacterial seeding [3].

1)
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2)
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