

ORIGINAL ARTICLE

EFFECT OF TUNNEL LENGTH ON INFECTION RATE IN PATIENTS WITH EXTERNAL VENTRICULAR DRAIN

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Background: External ventricular drain involves catheter placement in ventricles of brain. It is used for various purposes. Basic theme is to drain cerebrospinal fluid so as to control intracranial pressure. This study was carried out to see the effect of tunnel length on rate of infection. **Methods:** This was a cross-sectional study carried out in Department of Neurosurgery, Pakistan Institute of Medical Sciences, Islamabad during 14 months from 1st December 2008 to 31st January 2010. External ventricular drain was placed in admitted patients after meticulous aseptic technique in operation theatre at right Kocher's point. It was carried out through a scalp tunnel and was connected to drainage bag through a drip set. Both long (more than 5 Cm) and short (<5 Cm) tunnels were randomly made. Infection rate was estimated in patients who had change of cerebrospinal fluid colour or developed fever (as per protocol to have minimum handling of drain). All patients received prophylactic Ceftriaxone. **Results:** Among 76 patients long tunnel was made in 44 (57.9%) and short in 32 (42.1%). Three patients (3.9%) with long tunnel while 6 (7.9%) patients with short tunnel had infection. The overall infection was in 9 (11.8%) patients. **Conclusion:** External ventricular drain tunnel length strongly influences the rate of infection.

Keywords: External ventricular drain, tunnel length, infection, cerebrospinal fluid, hydrocephalous, intracranial pressure

INTRODUCTION

External ventricular drain (EVD) is a commonly performed life-saving procedure. It is done to relieve hydrocephalous and for monitoring of intracranial pressure.¹⁻⁴ It is a simple and safe procedure and is not only done by neurosurgeons but trained trauma surgeons and intensivists can also do it effectively.^{3,5} Various sites can be used including Kocher's, Dandy's, Keen's and Supra orbital.⁶ Though it is a simple procedure yet is not exempted from complications like infection, haemorrhage, meningitis and pneumo-encephalus.^{3,5} Infection is the most worrying aspect of its insertion. The incidence of infection ranges from 4–20%. The EVD tunnel length is controversial. Both short and long tunnels have been used with conflicting results.⁷

The objective of this study was to evaluate the effects of tunnel length on postoperative rate of infection.

MATERIAL AND METHODS

All admitted patients of either age and gender in the Department of Neurosurgery, Pakistan Institute of Medical Sciences, Islamabad during 14 months from 1st December 2008 to 31st January 2010 who had acute hydrocephalous and needed EVD insertion irrespective of the cause were included in the study.

Patients underwent EVD insertion in operation theatre after meticulous aseptic technique at right Kocher's point. Patients who had hydrocephalous secondary to meningitis, ventriculitis and all those who

were shifted with EVD from other hospitals were excluded. Size 8 infant feeding tube was put in as EVD and was carried out after making scalp tunnel of more than 5 Cm or less randomly in patients and was connected to drainage bag through a drip set. Prophylactic Ceftriaxone was started and continued till EVD was in place. Dressings were changed on third postoperative day and earlier if soaked. Rinsing, manipulation and repeated sampling were strongly discouraged as part of the laid protocol. If drainage stopped, a computerised tomogram (CT) scan of the brain was performed to determine catheter place and ventricular state. In cases of collapsed ventricles catheter was left in place while in cases of displacement and blockage it was adjusted. Infection rate was estimated in patients who developed fever or change of CSF colour after establishing it by sending CSF to PIMS Laboratory for Routine Examination and Culture/ Sensitivity.

RESULTS

Among 76 patients, 41 (53.9%) were men and 35 (46.1%) were women. Most (26.8%) were adults between 31–40 years of age. Mean age of the patients was 37.89±13.6 years. Mean duration of EVD was 11.41±5.54 days. Seven patients developed fever and two had change of CSF colour. Long EVD tunnel (>5 Cm) was made in 44 (57.9%) patients and short EVD (<5 Cm) in 35 (42.1%) of cases. Three patients (3.9%) with long EVD tunnel had infection while 6 patients (7.9%) with short EVD had infection. The overall infection rate was 11.8%.

DISCUSSION

Infection is a major complication after any CSF drainage system insertion.⁸ The EVD like any surgically implanted foreign body is at risk of infection. EVD infection is a common clinical problem and associated with potential morbidity and mortality.⁹ Various techniques have been employed to combat this hazard including per operative use of antibiotics, use of antibiotic impregnated catheters and making long tunnels. Likewise drain revision and multiple manipulations, repeated sampling and washing of EVD is said to be associated with increase chances of infection.^{3,11-14}

The EVD tunnel length is matter of debate. Many are in favour of long while others are favouring short tunnel.^{7,10} Some initially performed EVD with short tunnels later on converted to long after 5 days.¹⁵ In a study by Korineck *et al*⁷ tunnel length was not proved to be associated with increased infection rate, which in their study was 12.2%. In that study ventriculitis seemed to be introduced at the time of insertion rather than subsequent retrograde colonisation. However we found direct relationship between tunnel length and rate of infection and tunnel length had strong influence on rate of infection. Overall infection rate in our study was 11.8%.

Lozier AP *et al*¹⁶ adopted various other techniques to combat infection including use of single and double antibiotics. We used single third generation antibiotic (Ceftriaxone) throughout the entire period of EVD placement, and changed only if C/S showed other antibiotic sensitivity. Like other surgical procedures, revision of drain, manipulations and rinsing of catheter is associated with higher rate of infection compared with single procedure.¹⁷ We also adopted this policy and did any manipulation, if required, after repeat CT scan brain to know the position of drain if displaced.

CONCLUSION

The EVD though simple yet needs meticulous care to prevent infection. Length of EVD tunnel is a significant factor for infection.

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