

**TRIAL FOR STANDERDIZATION OF PROPHYLACTIC
ANTIBIOTICS BASED ON RESULTS OF PREVIOUS
CULTURES IN CRANIAL NEUROSURGICAL
PROCEDURES AT KASR AL-AINI TEACHING
HOSPITAL.DOES IT REDUCE INCIDENCE OF CSF &
SURGICAL SITE INFECTION?**

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anesthesiology

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CONTENTS

Acknowledgement	II
Abstract.....	III
List of tables.....	V
List of figures.....	VII
List of abbreviations.....	VIII
Introduction.....	1
Aim of work.....	2
Review of Literature.....	
Chapter (1): <i>Anatomy & Physiology of CSF</i>.....	3
Chapter (2): <i>CSF Infection</i>.....	11
Chapter (3): <i>SSI</i>.....	22
Materials and Methods.....	43
Results.....	48
Discussion.....	56
English Summary.....	60
References.....	62
Arabic summary.....	

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ABSTRACT

Introuction

Postoperative CSF and surgical site infection in patients undergoing cranial neurosurgical procedures is a challenging issue that may result in serious morbidity & mortality

Methodology

Cohort study comparing the incidence of postoperative CSF and surgical site infection in otherwise healthy ASA I and ASA II neuro-surgical patients undergoing craniotomy, in which the intervention group received prophylactic antibiotics according to the proposed protocol during the period from April 2014 to April 2015, while the control group follows the records of patients during the period from April 2013 to April 2014 when prophylactic antibiotic protocols were lacking or were not implemented.

Results

The overall incidence of meningitis was 3.5% in the pre-protocol group & 2.1% in the post-protocol group. The incidence of SSI was 4 % in the pre-protocol group & 3.5 % in the post-protocol group.

The most common organisms causing meningitis & SSI were Klebsiella, Enterococci, Staph-aureus, Acinatobacter, E-coli & Pseudomonas MRSA. The following organisms [Pseudomonas, Enterococci, Ecoli & MRSA] decreased in the period following application of the protocol, while [Stahp-aureus & klebsiella] increased in the period following application of the protocol, although neither the decrease nor the increase

were statistically significant.

Conclusion

Although the incidence of infection decreased after application of protocol this was not statistically significant, this may require a longer period of observation and modification of the prophylactic antibiotic protocol considering the variation of the organisms & results of positive cultures.

Keywords

CSF -LP-BBB-TANDERDIZATION- NEUROSURGICAL

LIST OF TABLES

Table No.	Title	Page No.
1	Ventricular system of the brain	6
2	Comparison of Average Serum and Cerebrospinal Fluid	8
3	Reference ranges for ions and metals in CSF	9
4	Reference ranges for other molecules in CSF	9
5	Reference ranges for other CSF constituents	10
6	CSF findings in different forms of CSF infection	16
7	Empirical antibiotics for CSF infection .	19
8	Classifications Of Wounds According To The Degree Of Contamination[	26
9	Suggested initial dose and time to re-dose for selected antimicrobial agents used for surgical prophylaxis	37

10	Antimicrobial prophylaxis in clean operations	38
11	Antimicrobial prophylaxis in clean-contaminated operations	39,40
12	Antimicrobial prophylaxis in contaminated-infected operations	41
13	Demographic Data [ASA & Sex]	47
14	Demographic Data [Age]	48
15	Type of operation [Supra & Infra-tentorial]	48
16	Total Leucocytic Count [TLC] in both groups	49
17	Incidence of surgical site infection [SSI] in both groups.	50
18	Incidence of CerebroSpinal Fluid Infection [CSF] in both groups	51
19	Types of organisms & its distribution in both groups	53

LIST OF FIGURES

Fig.No.	Title	Pages
1	CSF production, circulation & reabsorption	4
2	Ventricular system of the brain	5
3	Type of operation [supra & Infra-tentorial]	48
4	Total Leucocytes Count[TLC]	49
5	Incidence of Surgical Site Infection[SSI] in both groups	50
6	Incidence of Cerebrospinal fluid [CSF] infection in both groups	51
7	Types of organisms & its distribution in both groups	52

LIST OF ABBREVIATIONS

SSI	: Surgical Site Infection
CSF	: Cerebro-Spinal Fluid
CNS	: Central Nervous System
TLC	: Total Leucocytic Count
LP	: Lumbar Puncture
G	: Gram
Kg	: Kilogram
Hrs	: Hours
BBB	: Blood Brain Barrier

INTRODUCTION

CSF infection is a life threatening complication of intracranial surgery [1,2]. Several risk factors have been identified, such as postoperative CSF leakage, CSF shunts, an infected surgical route, and emergency surgery [1,3-4]

Surgical site infections (SSIs) are among the most common health care associated infections accounting for 20% to 31% of health care associated infections in hospitalized patients [5,6] and have considerable morbidity, a mortality rate of 3%. [6,7]

Several risk factors were believed to be associated with increased development of SSI including multiple operations , CSF leak , duration of surgery , altered sensorium , age , use of corticosteroid and diabetes [8,9]

Postoperative CSF and surgical site infection in patients undergoing cranial neurosurgical procedures is a challenging issue[10,11] that may result in serious morbidity & mortality .

So we are trying to build up a prophylactic antibiotic protocol in our institute & detect its consequences on reduction of the incidence of postoperative CSF and surgical site infection in our neurosurgical ward & ICU procedures in Kasr Al-aini teaching hospital following elective cranial neurosurgical procedures.

AIM OF WORK

The purpose of this cohort study is to detect the consequences of application of a prophylactic antibiotic protocol on the incidence of postoperative CSF and surgical site infection in elective cranial neurosurgical procedures in Kasr Al-Aini teaching hospital.

ANATOMY & PHYSIOLOGY OF CEREBROSPINAL FLUID

Introduction

Cerebrospinal fluid[CSF] is a clear colorless bodily fluid found in the brain and spine. It is produced by the choroid plexus of the brain. The CSF occupies the subarachnoid space (the space between the arachnoid mater and the pia mater) and the ventricular system around and inside the brain and spinal cord.[10,11]

CSF act as neutral buoyancy, which allows the brain to maintain its density without being impaired by its own weight which would cut off blood supply and kill neurons in the lower sections without CSF.

CSF protects the brain tissue from injury when jolted or hit, allows for homeostatic regulation of the distribution of neuro-endocrine factors, to which slight changes can cause problems or damage to the nervous system.[12]

Production

The brain produces roughly 500 mL of cerebrospinal fluid per day. This fluid is constantly reabsorbed, so that only 100-160 mL is present at any one time. Ependymal cells of the choroid plexus produce more than two thirds of CSF. The choroid plexus is a venous plexus contained within the four ventricles of the brain, hollow structures inside the brain filled with CSF. The remainder of the CSF is produced by the surfaces of the ventricles and by the lining surrounding the subarachnoid space.[10]

Ependymal cells actively secrete sodium into the lateral ventricles. This creates osmotic pressure and draws water into the CSF space.

Chloride which is negatively charged moves along with the positively charged sodium to maintain neutrality. As a result, CSF contains a higher concentration of sodium and chloride than blood plasma, but less potassium, calcium and glucose and protein.[10,11].

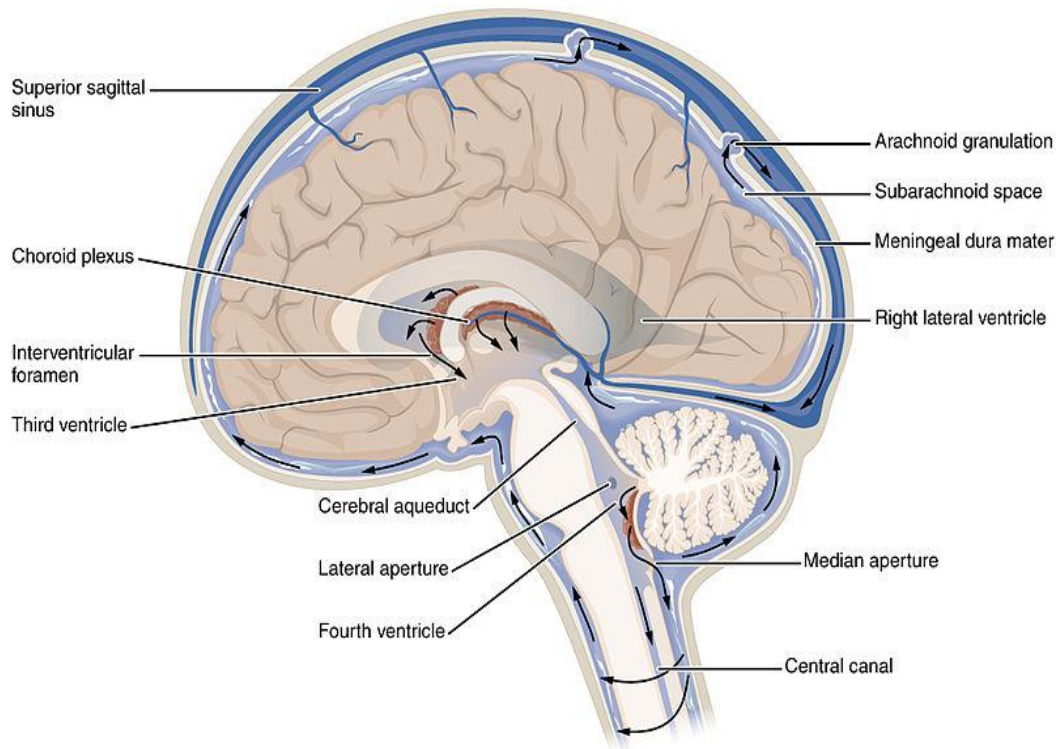


Figure-1CSF production, circulation & reabsorption[24]

Circulation

CSF circulates within the ventricular system of the brain. The ventricles are a series of cavities filled with CSF, inside the brain. The majority of CSF is produced from within the two lateral ventricles. From here, the

CSF passes through the interventricular foramina to the third ventricle, then the cerebral aqueduct to the fourth ventricle.

The fourth ventricle is an outpouching on the posterior part of the brainstem. From the fourth ventricle, the fluid passes through three openings to enter the subarachnoid space – these are the median aperture, and the lateral apertures. The subarachnoid space covers the brain and spinal cord.[10]

Ventricular System

The system comprises four ventricles:

- lateral ventricles right and left (one for each hemisphere)
- third ventricle
- fourth ventricle

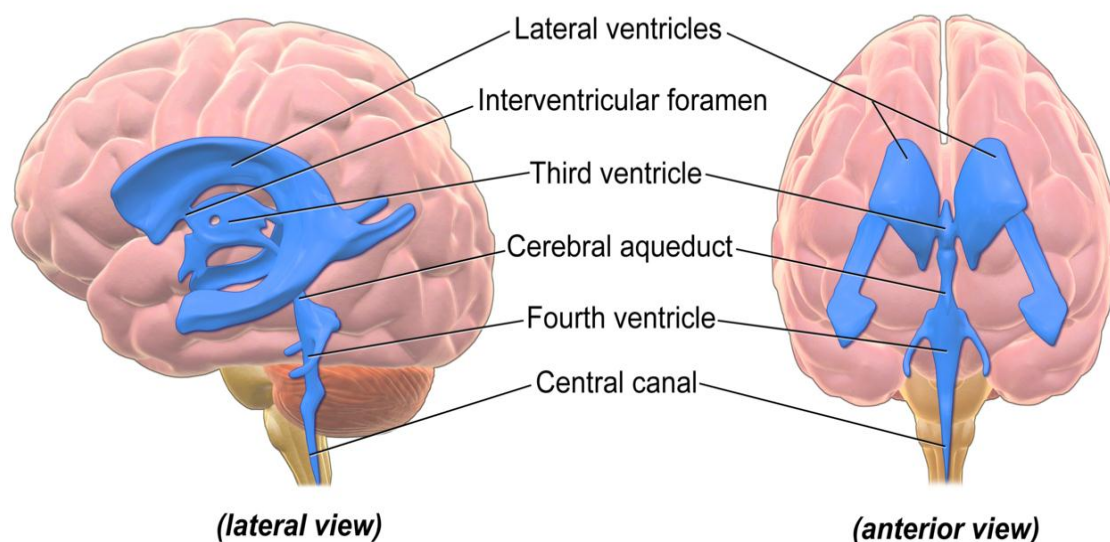


Figure-2 Ventricular system of the brain[25]

The four cavities of the human brain are called ventricles. The two largest are the lateral ventricles in the cerebrum; the third ventricle is in the diencephalon of the forebrain between the right and left thalamus; and the fourth ventricle is located at the back of the pons and upper half of the medulla oblongata of the hindbrain. The ventricles are concerned with the production and circulation of cerebrospinal fluid[25]

There are several foramina, openings acting as channels, that connect the ventricles.

Table-1ventricular system of the brain[25]

Name	From	To
interventricular foramina (Monro)	lateral ventricles	third ventricle
cerebral aqueduct (Sylvius)	third ventricle	fourth ventricle
median aperture (Magendie)	fourth ventricle	subarachnoid space via the cisterna magna
right and left lateral aperture (Luschka)	fourth ventricle	subarachnoid space via the cistern of great cerebral vein

Reabsorption

It had been thought that CSF returns to the vascular system by entering the dural venous sinuses via the arachnoid granulations (or villi).[13]