EARLYDRAIN trial

In retrospective studies, prophylactic lumbar drainage of cerebrospinal fluid was associated with favorable outcome [1) 2)].

A plausible mechanism of action is the increased removal of blood and its degradation products using gravity. However, the prospective Lumbar Drainage in Subarachnoid Haemorrhage (LUMAS) trial randomizing 210 patients was unable to confirm the benefit of lumbar drainage [3)].

In hindsight, it recruited less severely affected patients with a lower risk of adverse outcomes and may thus have been underpowered to detect a significant effect

So Wolf et al. designed the EARLYDRAIN trial to investigate the effect of a lumbar cerebrospinal fluid drainage among patients with a ruptured cerebral aneurysm. The hypothesis was that early application of a lumbar drain leads to an improved outcome after subarachnoid hemorrhage, measured by the modified Rankin Scale (mRS) score at 6 months.

In this trial, prophylactic lumbar drainage after aneurysmal subarachnoid hemorrhage lessened the burden of secondary infarction and decreased the rate of unfavorable outcomes at 6 months. These findings support the use of lumbar drains after aneurysmal subarachnoid hemorrhage. [4)]

Summary

The EARLYDRAIN trial is a significant study that aimed to investigate the effects of prophylactic lumbar cerebrospinal fluid drainage in patients with a ruptured cerebral aneurysm who had experienced subarachnoid hemorrhage. The trial had the hypothesis that early application of a lumbar drain would lead to improved outcomes, as measured by the modified Rankin Scale (mRS) score at 6 months. The study found several noteworthy results and limitations:

Key Findings:

Positive Outcomes: The trial found that prophylactic lumbar drainage after aneurysmal subarachnoid hemorrhage reduced the burden of secondary infarction and decreased the rate of unfavorable outcomes at 6 months. This suggests that lumbar drainage may be beneficial in these patients.
Limitations:

Funding and Personnel: One significant limitation of the EARLYDRAIN trial was the inability to secure sufficient funding, which affected the timely completion of the study and the hiring of dedicated personnel. This could have potentially impacted the quality and rigor of the trial.

Crossover Patients: A significant number of patients in the lumbar drain group did not receive the allocated intervention for various reasons. While sensitivity analysis supported the findings from the intention-to-treat analysis, this raises concerns about the consistency of the treatment effect.

Lack of Blinding: Patients, relatives, and acute care clinicians were not blinded to the intervention. Although blinded outcome assessment of radiological imaging and clinical status at 6 months was performed, the lack of blinding could introduce bias into the results.

Data Collection: The trial did not collect data on preexisting hypertension and other premorbid

prognostic factors. Additionally, detailed information on the thickness of clots or the amount of intraparenchymal and intraventricular blood in the initial CT scan was not recorded. This lack of data could limit the ability to account for important confounding factors.

Medical Complications: The trial did not record medical complications during the clinical course, which are known to occur frequently in patients with subarachnoid hemorrhage. The absence of this data may affect the comprehensive understanding of patient outcomes.

Limited Scope: The EARLYDRAIN trial did not investigate the additional application of clot thrombolysis or irrigation of the subarachnoid space. It also did not evaluate the potential benefits of higher drainage rates than the suggested 5 mL per hour, although some patients received a higher drainage amount. These factors represent potential avenues for future research to refine treatment protocols.

In summary, while the EARLYDRAIN trial suggests a potential benefit of prophylactic lumbar drainage in patients with ruptured cerebral aneurysms and subarachnoid hemorrhage, it is essential to consider its limitations, including funding constraints, lack of blinding, and incomplete data collection. Further research may be needed to confirm and refine the findings and to explore additional treatment strategies in this patient population.

Test

Here's a multiple-choice test based on the information provided about the EARLYDRAIN trial and its findings:

What was the primary hypothesis of the EARLYDRAIN trial? a) Lumbar drainage has no effect on outcomes after subarachnoid hemorrhage. b) Early application of a lumbar drain improves outcomes after subarachnoid hemorrhage. c) Lumbar drainage worsens outcomes after subarachnoid hemorrhage. d) Lumbar drainage only affects short-term outcomes after subarachnoid hemorrhage.

What did the EARLYDRAIN trial find regarding the use of prophylactic lumbar drainage? a) Lumbar drainage had no impact on secondary infarctions. b) Lumbar drainage increased the rate of unfavorable outcomes at 6 months. c) Lumbar drainage lessened the burden of secondary infarction and decreased unfavorable outcomes. d) Lumbar drainage only affected short-term outcomes.

What was a significant limitation of the EARLYDRAIN trial? a) The trial lacked a control group. b) Patients were blinded to the intervention. c) The trial had insufficient funding and personnel. d) The trial did not collect data on post-surgery complications.

Why was the LUMAS trial unable to confirm the benefit of lumbar drainage? a) It had a larger patient population. b) It recruited more severely affected patients. c) It used a different outcome measurement. d) It did not randomize patients.

What aspect of the EARLYDRAIN trial's methodology could be improved in future research? a) Increasing the suggested lumbar drainage rate. b) Collecting more data on preexisting hypertension. c) Blinding patients, relatives, and clinicians to the intervention. d) Not conducting sensitivity analysis.

Answers:

b) Early application of a lumbar drain improves outcomes after subarachnoid hemorrhage. c) Lumbar drainage lessened the burden of secondary infarction and decreased unfavorable outcomes. c) The

trial had insufficient funding and personnel. b) It recruited more severely affected patients. a) Increasing the suggested lumbar drainage rate.

1)
Grossen AA, Ernst GL, Bauer AM. Update on intrathecal management of cerebral vasospasm: a systematic review and meta-analysis. Neurosurg Focus. 2022;52(3):E10. doi:10.3171/2021.12.FOCUS21629
2)
Hulou MM, Essibayi MA, Benet A, Lawton MT. Lumbar drainage after aneurysmal subarachnoid hemorrhage: a systematic review and meta-analysis.
3)
Al-Tamimi YZ, Bhargava D, Feltbower RG, et al. Lumbar drainage of cerebrospinal fluid after aneurysmal subarachnoid hemorrhage: a prospective, randomized, controlled trial (LUMAS). Stroke. 2012;43(3):677-682. doi:10.1161/STROKEAHA.111.625731
4)
Wolf S, Mielke D, Barner C, Malinova V, Kerz T, Wostrack M, Czorlich P, Salih F, Engel DC, Ehlert A, Staykov D, Alturki AY, Sure U, Bardutzky J, Schroeder HWS, Schürer L, Beck J, Juratli TA, Fritsch M, Lemcke J, Pohrt A, Meyer B, Schwab S, Rohde V, Vajkoczy P; EARLYDRAIN Study Group. Effectiveness of Lumbar Cerebrospinal Fluid Drain Among Patients With Aneurysmal Subarachnoid Hemorrhage: A Randomized Clinical Trial. JAMA Neurol. 2023 Aug 1;80(8):833-842. doi: 10.1001/jamaneurol.2023.1792. Erratum in: JAMA Neurol. 2023 Aug 1;80(8):873. PMID: 37330974; PMCID: PMC10277935.