Is Meckel’s cave routinely evaluated by Northern Radiology trainees?

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1. Introduction

- Meckel’s cave is a paired CSF-filled pouch located in the posteromedial aspect of the middle cranial fossae (Figure 1), and is the home of the Trigeminal nerve ganglion (5th cranial nerve).
- This study was undertaken after a subtle right Meckel’s cave abnormality was missed on an MRI brain by a trainee and consultant, with a history of prostate cancer and right facial numbness provided. This was then discovered on a CT brain examination performed three months later (Figure 3).

1.1 Prostate Cancer & Intracranial Metastases

- Prostate cancer is exceedingly common with men having a lifetime risk of 11% of being diagnosed with it [2].
- Prostate cancer commonly metastasises to the axial and appendicular skeleton, as well as lungs, pleura, liver and adrenal glands [3].
- Published autopsy series: intracranial metastases are reported from 1-6% in patients with a pre-mortem examination [3].
- Published literature: metastases to Meckel’s cave have only been reported in three documented cases [5].
- Metastases to Meckel’s cave have only been reported in three documented cases [5].
- This case is presumed to be secondary to a prostate cancer metastasis.

2. Aims

- Null hypothesis: Meckel’s cave is not routinely evaluated by radiology trainees.
- Aims:
  1. Whether or not trainees are routinely evaluating Meckel’s cave when reporting an MRI brain examination.
  2. Whether or not trainees have knowledge about the rare possibility of intracranial metastases from prostate cancer.
  3. Whether or not trainees have knowledge regarding the anatomy and function of the Trigeminal nerve.

3. Materials & Methods

- 37 trainees (ST2-ST5) were shown the axial T2-weighted sequence of the examination in three main stages, with an additional stage added if the key abnormality was not identified (each stage lasting two minutes):
  1. Stage One: With no history provided;
  2. Stage Two: With the history of prostate cancer provided;
  3. Stage Three: With the additional history of right-sided facial numbness provided;
  4. Stage Four: If the trainee was unable to discern the key abnormality at this stage, they were asked to locate Meckel’s cave.

4. Results

- Approximately 25% of trainees had the anatomical knowledge but were unsure about the function of the Trigeminal nerve. We found that these trainees confused the loss of facial sensation with a Facial palsy (7th cranial nerve) problem, and therefore wrongly evaluated the cerebello-pontine angle.
- Only one trainee was aware of the fact that prostate cancer rarely metastasises to the brain.
- As expected, there was positive correlation between abnormality identification and seniority, especially post-FRCR.
- There is no available literature suggesting that Meckel’s cave is currently part of a routine review area checklist when reporting routine MR brain examinations.
- None of the trainees routinely evaluated Meckel’s cave.
- Approximately 25% of trainees had knowledge regarding both the anatomy and function of the Trigeminal nerve.
- Approximately 25% of trainees had the anatomical knowledge but were unsure about the function of the Trigeminal nerve. We found that these trainees confused the loss of facial sensation with a Facial palsy (7th cranial nerve) problem, and therefore wrongly evaluated the cerebello-pontine angle.
- Only one trainee was aware of the fact that prostate cancer rarely metastasises to the brain.
- As expected, there was positive correlation between abnormality identification and seniority, especially post-FRCR.
- Trainees do NOT routinely evaluate Meckel’s cave.
- The function and anatomy of the Trigeminal nerve is poorly understood.

5. Discussion

- We believe that Meckel’s cave should be a routine review area when reporting MR brains.
- Key Results Summary:
  1. 19/37 trainees knew the anatomical location of Meckel’s cave.
  2. 13/37 trainees knew both the function and anatomy of the Trigeminal nerve.
  3. Only one trainee had the knowledge about the link between prostate cancer and intracranial metastases, as well as the function and anatomy of the Trigeminal nerve.

6. Conclusion

- Trainees do NOT routinely evaluate Meckel’s cave.
- The function and anatomy of the Trigeminal nerve is poorly understood.

References