論 文 の 内 容 の 要 旨

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論 文 題 目

Watertight Robust Osteoconductive Barrier For Complex Skull Base Reconstruction: An Expanded-Endoscopic Endonasal Experimental Study.
（WRO バリヤー：広範頭蓋底腫瘍に対する経鼻内視鏡手術における新たな頭蓋底再建法）

（論文の内容の要旨）

Objectives:

Endoscopic skull base reconstruction (ESBR) following expanded-endoscopic endonasal approaches (EEA) in high-risk non-ideal endoscopic reconstructive candidates remains extremely challenging, and further innovations still necessary. Here, the aim is to study the reconstructive knowledge gap following expanded-EEA and to introduce the watertight robust osteoconductive (WRO) barrier as an alternative durable option.

Methods:

Distinctively, we focused on ten clinical circumstances. A 3D-skull base-water system model was innovated to investigate the ESBR under realistic conditions. In the endoscopic, wet environment, a large-irregular defect (31x89 mm) extending from the crista galli to the mid-clivus was achieved. The internal carotid arteries on both sides are identified, based on the pertinent anatomical landmarks, and fully skeletonized. All exposed imaginary neurovascular structures are protected with Integran Sheet and Gore-Tex Sheet as an in-lay layer to avoid any potential injury and to prevent the injected substances from herniating into the cranial cavity during ESBR. Then, 12 ml of bone forming agent Biopex^{R} was carefully fashioned in an S-shaped manner starting from the anterior cranial base backwards to the clivus to adequately compensate for the defect and to make a *"robust osteoconductive"* layer. Furthermore, in order to ensure water tightness, 5 ml of fibrin glue was applied to seal any invisible tiny channels in order to from a *"watertight"* barrier.

After creating the WRO-barrier, its tolerance was evaluated under stressful settings, including an exceedingly high (55 cmH_2O) pressure, with radiological assessment. Next, the whole WRO-barrier was drilled to examine its practical-safe removal (simulating redo-EEA) and the whole experiment was repeated five times. Finally, WRO-barrier was kept into place to value its 18-month long-term high-tolerance.

Results:

In all experiments WRO-barriers were satisfactorily fashioned to conform the geometry of the created defect under realistic circumstances via EEA, tolerated an exceedingly high pressure without evidence of leak even under stressful settings, resisted sudden-elevated pressure, and remained in its position to maintain long-term watertight seal (18 months), efficiently evaluated with neuroimaging and simply removed-and-reconstructed when redo-EEA is needed.

Conclusion:

WRO-barrier as an osteoconductive watertight robust design for cranial base reconstruction possesses several distinct qualities that might be beneficial for patients with complex skull base tumours.