

Technique

Surgical technique for a cystic-type metastatic brain tumor: transformation to a solid-type tumor using hydrofiber dressing

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Abstract

Background: Many metastatic brain tumors have a distinct border with normal brain tissue, which facilitates tumor removal. However, residual tumor tissue may be present after surgery when metastatic brain tumors are of cystic type. We have developed a method using hydrofiber dressing to transform cystic-type into solid-type tumors.

Methods: Hydrofiber dressing is a sodium carboxymethylcellulose hydrocolloid polymer with high fluid-absorptive capacity. This material was originally used as a dressing for exudative wounds. Hydrofiber dressing was used for 8 patients with cystic-type metastatic brain tumor. Tumor removal was performed after hydrofiber dressing was inserted into the cyst cavity to transform the tumor into a solid-type tumor.

Results: Transformation of cystic-type metastatic brain tumors into smaller solid-type tumors using hydrofiber dressing facilitated en bloc resection of tumor. The dressing also absorbed residual cyst fluid and was thus also effective in preventing intraoperative dissemination of tumor cells. This approach enabled ideal en bloc resection in all patients. There were no adverse events.

Conclusions: These findings suggest hydrofiber dressing may be useful in surgery for cystic-type metastatic brain tumors.

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Keywords:

Metastatic brain tumor; Cystic type; Hydrofiber dressing; En bloc resection

1. Introduction

The efficacy of surgery for local control of brain metastases has been confirmed in several randomized trials [5,6,8]. In most cases, the goal of such surgery is gross total resection of the tumor, and the prognosis is good after this procedure [3,6,7]. However, cystic-type metastatic brain tumors may have injury to the cyst wall during surgery, which can in some cases result in incomplete tumor resection and dissemination of cancer cells in cyst fluid [4]. To

facilitate resection, cystic-type tumors are often transformed into solid-type tumors by insertion of cotton sheets into the cyst cavity after fine-needle fluid aspiration. However, with use of these sheets, it is difficult to ensure that the tumor is solid and that absorption of cyst fluid is complete. With the aim of improving the rate of resection in this situation, we have developed a method using hydrofiber dressing to transform cystic-type into solid-type tumors and described here the effectiveness of this method.

2. Methods

Hydrofiber dressing (Aquacel; Convatec, London, United Kingdom) is a sodium carboxymethylcellulose hydrocolloid

Abbreviation: MRI, magnetic resonance imaging.

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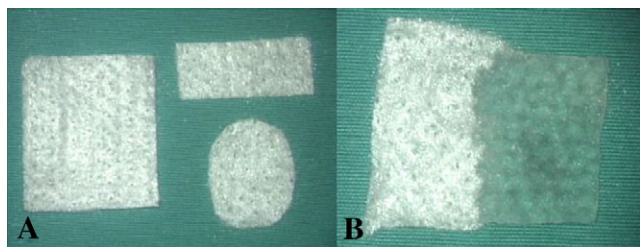


Fig. 1. Images of hydrofiber dressing. A: Hydrofiber dressing can be cut into various sizes. B: The region shows hydrofiber dressing filled with physiologic saline.

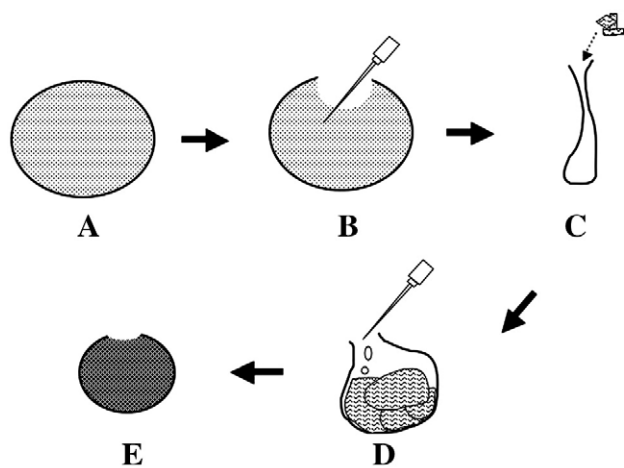


Fig. 2. Schema of cystic-type metastatic brain tumor surgery using hydrofiber dressing. A: Cystic-type tumor before use of hydrofiber dressing. B: Suctioning of fluid in the cyst. C: Hydrofiber dressing was inserted in the cyst cavity to absorb residual fluid. D: Injection of physiologic saline. E: The hydrofiber dressing absorbed the fluid in the cyst cavity and filled the cyst, thereby, transforming the tumor into a solid-type tumor.

polymer with high fluid-absorptive capacity equal to 25 times its own weight. This material also has a high capacity to retain absorbed water (Fig. 1). Several sheets of hydrofiber dressing were cut into appropriate sizes and inserted into the tumor cyst. Subsequent injection of physiologic saline caused the dressing to gelate and unite with the tumor, which then allowed en bloc resection as for a solid-type tumor. A schema of cystic-type metastatic brain tumor surgery using hydrofiber dressing is shown in Fig. 2.

3. Results

Hydrofiber dressing was used for 8 patients with cystic-type metastatic brain tumor. This approach made it possible to perform ideal en bloc resection in all patients. There were no adverse events due to the hydrofiber dressing.

3.1. Representative cases

3.1.1. Case 1

A typical case of en bloc resection using a hydrofiber dressing. The patient had a cystic-type metastatic brain tumor in the right occipital lobe (Fig. 3A). First, the cyst was opened for suctioning of fluid (Fig. 4A). A small cut was made on the tumor surface to absorb the fluid contents of the cyst and then hydrofiber dressing was inserted into the cyst (Fig. 4B and C), followed by injection of physiologic saline to fill the cyst (Fig. 4D). Because the tumor was soft, displacement of it was easy (Fig. 4E). En bloc resection was performed (Fig. 4F), and postoperative MRI revealed no residual tumor (Fig. 3B and C).

3.1.2. Case 2

A case in which a cystic tumor was transformed to a smaller solid-type tumors, as confirmed by intraoperative ultrasonography. The patient had a cystic-type metastatic brain tumor in the left frontal lobe (Fig. 5A). The tumor, which was a large cystic mass before insertion of the

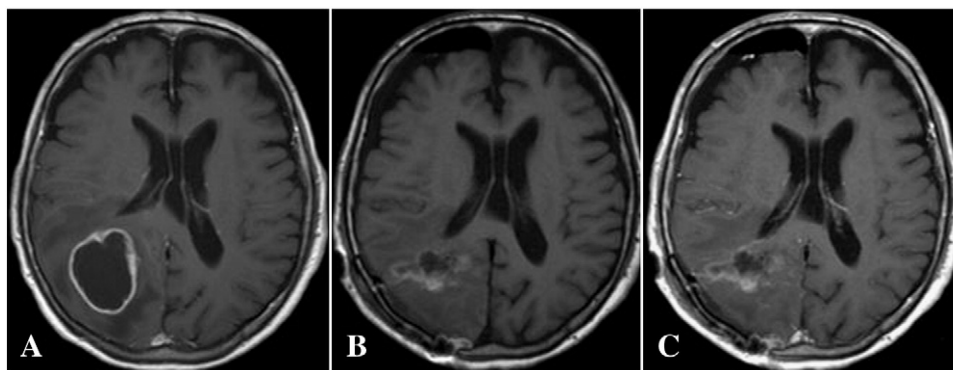


Fig. 3. Magnetic resonance images. A: Preoperative enhanced T1-weighted image showing a metastatic brain tumor in the right occipital lobe. B: T1-weighted image 1 day after surgery showing no residual tumor. C: Enhanced T1-weighted image 1 day after surgery, also showing no residual tumor.

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