Recession of Ommaya Reservoir Improves Cosmesis in Patients Undergoing Intrathecal Chemotherapy for Leptomeningeal Disease

Darryl Lau, Nathan Rowland, Sharon Devasagaya, Michael W. McDermott

1.

Corresponding author: Nathan Rowland, rowlandn@neurosurg.ucsf.edu

Abstract

Introduction: Ommaya reservoirs are indicated for administration of intrathecal chemotherapy in the setting of leptomeningeal disease. The standard approach for insertion is a burr hole overlying the frontal horn with fixation of the device flange to the periosteum of the skull for stabilization. However, the dome of the Ommaya using this technique can create a cosmetically unacceptable result for patients with alopecia related to their treatment.

Materials and Methods: We describe a simple modification of the standard technique for insertion of Ommaya reservoirs that recesses the flange onto the inner table of the skull and secures the device with small titanium screws.

Results: This technique has been used in 18 patients at our institution with cosmetically superior results. However, medical oncologists need to be made aware of the fact that the device is recessed so they can be assured that it is still present and can be used.

Conclusions: The recessed Ommaya reservoir technique is an option for the placement of Ommaya reservoirs in patients who will undergo intrathecal therapy. This paper describes a technique that has been used in 18 patients with whom the cosmetic results were felt to be superior.

Categories: Neurosurgery

Keywords: intrathecal chemotherapy, ommaya reservoir, Neurosurgery, CNS tumor, leptomeningeal disease

Introduction

Systemic delivery of agents to the cerebrospinal fluid (CSF) and brain is greatly limited by the blood brain barrier. In order to overcome this, the Ommaya reservoir and ventricular catheter system were introduced in 1963 as a closed delivery method to the ventricular spaces [1]. The Ommaya was initially used to treat infection; however, today it is most commonly used in the management of leptomeningeal spread from malignant CNS tumors [2]. In some cases, it may be necessary to use frameless navigation to accurately target the ventricle [3-5]. Nevertheless, techniques for anchoring the reservoir have to a large extent remain unchanged, i.e., the device is still placed immediately under the scalp after attaching the ventricular catheter. Hence, using this technique, the Ommaya reservoir is readily visualized and palpable externally even after wound healing. This may be cosmetically disconcerting in patients who undergo chemotherapy and experience significant alopecia. In this technical note, we describe a new technique that allows the Ommaya reservoir to be recessed into the inner skull table and preserves optimal functional and cosmetic results.

Technical Report

Methods

Following general anesthesia, a standard reverse U-shaped scalp incision is marked in the pre-coronal area two and a half centimeters lateral to the midline. Exclusion of lesions along the tract of the proposed insertion site is confirmed with preoperative imaging. The skin is incised and reflected posteriorly with the periosteum. An Ommaya 'template' consisting of a rod attached to a thin disk with the same outside circumference as the outer flange on the Ommaya reservoir device is then used to outline the circumference of the Ommaya reservoir using a surgical marking pen. This custom-made template is used intra-operatively as a sterile instrument to outline the dimensions of the flange of the Ommaya reservoir on the frontal bone (see Figure 1A for template resembling a 'nickel on a stick'). A round cutting burr is then used to drill out the outer table following this template outline, down through the diploic space until the cortical bone on the inner table is encountered. The inner table is then drilled out in a small area centrally to expose a small area of the dura (Figure 2A). The dura is then opened in a standard fashion.

The distance from the diploic space to the frontal horn of the lateral ventricle is calculated using

Review began 10/19/2012

Published 11/12/2012

© Copyright 2012

Lau et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 3.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

How to cite this article

Lau D, Rowland N, Devasagaya S, et al. (November 12, 2012) Recession of Ommaya Reservoir Improves Cosmesis in Patients Undergoing Intrathecal Chemotherapy for Leptomeningeal Disease. Cureus 4(11): e66. DOI 10.7759/cureus.66

preoperative imaging. The vertical distance from the connection point on the bottom of the Ommaya reservoir to the flange is 0.7 centimeters. This must be taken into account and subtracted from the total length of the construct when measuring the distance on the corona! scan. For example, if the calculated distance is 5.7 centimeters from the skull inner table to the desired position within the ventricle, then the ventricular catheter is cut at 5 centimeters and connected to the reservoir. Then a 25 gauge spinal needle is used as the stylet for insertion of the composite device (Ommaya with catheter attached) into the ventricle (Figure 1B). Once the flange is resting on the inner table of the skull, 4-millimeter titanium screws are inserted obliquely so that the head of the screws secures the flange of the Ommaya reservoir (Figures 1C, 1D) (Figure 2B) to the skull. The wound is then closed in standard fashion. As seen in Figure 1E, the Ommaya reservoir is recessed into the skull allowing it to be undetected compared to the traditional placement of the Ommaya reservoir (Figures 1F, 2C).

FIGURE 1: Surgical Diagram

FIGURE 2: Surgical Procedure

Results

This technique has been safely used in 18 patients in our surgical oncology practice. To date, there have been no complications or adverse events related to this technique. Cosmetically, the patients find this much more acceptable than the standard convex protrusion under the scalp that is visible in patients with treatment-related alopecia. Notably, we have had one referral to the emergency department at our institution by a medical oncologist who claimed that "the Ommaya has dissolved." In fact, in this patient the Ommaya was present, ballottable under the skin, and functional. Therefore, our updated practice has been to communicate with our oncology colleagues when this technique is used and the calculated distances from midline where the device should be located.

Discussion

Insertion of Ommaya reservoirs for intrathecal chemotherapy has been established as the standard neurosurgical intervention for management of leptomeningeal disease [2], although indications also exist for other agents, such as antifungals. The standard technique for insertion follows identification of Kocher's point and targeting of the frontal ventricular horn. In this article, we describe an alternative to the standard burr-hole configuration, which consists of placing the flange of the device on the outer table of the skull and securing it to the periosteum with sutures. With our technique, the flange rests instead on the inner table of the skull, recessing the dome of the Ommaya so that it does not protrude into the overlying scalp. The device is easily ballottable underneath the U-shaped scalp incision. This technique does not result in changes in reservoir function, though medical oncologists need to be made aware of the fact that the device is recessed so they can be assured that it is still present and can be used. As an additional measure of safety, ultrasound guidance may be used by providers during the initial access to locate the device.

Conclusions

Recessed insertion of an Ommaya reservoir into the frontal horn for intrathecal chemotherapy provides a cosmetically superior result for patients who may develop alopecia during the course of their chemotherapy. The described method has been used successfully by the senior author in a cohort of patients without complications. This paper describes the technique and is an option for surgeons to consider in their practices.

Additional Information

Disclosures

Human subjects: Consent was obtained by all participants in this study. This article involved 1 human patient from which informed consent was obtained. This article adheres to all ethical guidelines. The authors report no conflicts of interest. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. Sundaresan N, Suite ND: Optimal use of the Ommaya reservoir in clinical oncology. . *Oncology* (Williston Park). 1989, 3:15-22.
2. Sandberg DI, Bilsky MH, Souweidane MM, Bzdil J, Gutin PH: Ommaya reservoirs for the treatment of leptomeningeal metastases.. *Neurosurgery*. 2000, 47:49-54. [10.1097/00006123-200007000-00011](https://doi.org/10.1097/00006123-200007000-00011)
3. Greenfield JP, Schwartz TH: Catheter placement for Ommaya reservoirs with frameless surgical navigation: Technical note. *Stereotact Funct Neurosurg*. 2008, 86:101-105. [10.1159/000112431](https://doi.org/10.1159/000112431)
4. McDermott MW, Ciricillo SF, Gutin PH, Edwards MS: Stereotactic insertion of an Ommaya reservoir: technical note.. *Can J Neurol Sci*. 1995, 22:235-238.
5. Takahashi M, Yamada R, Tabei Y, Nakamura O, Shinoura N: Navigation-guided Ommaya reservoir placement: Implications for the treatment of leptomeningeal metastases.. *Minim Invasive Neurosurg*. 2007, 50:340-345. [10.1055/s-2007-993162](https://doi.org/10.1055/s-2007-993162)