Role of Preoperative Embolisation: Systemic Review of the importance of following up the neurological deficit and preoperative complication in meningioma with perioperative embolis...
Role of Preoperative Embolisation: Systemic Review of the importance of following up the neurological deficit and preoperative complication in meningioma with perioperative embolisation after craniotomy

Renindra Ananda Aman¹, Ria Margiana²*, Silvia Werdhi Lestari³

¹Department of Neurosurgery, Faculty of Medicine, Universitas Indonesia, Dr. Ciptomangunkusumo General Hospital, Jakarta, Indonesia
²Department of Anatomy, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia.
³Department of Medical Biology, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia.

Abstract

The importance of preoperative embolisation in intracranial meningiomas has caught the eyes of several researchers and authors. Preoperative embolisation has been shown by several studies and authors to have several benefits in managing meningiomas by craniotomy. Some of the benefits include a reduction in blood loss, reduced surgical complications and improved outcome. Even though the procedure is said to have several benefits, its application as a standard practice is limited because of several reasons. One of the reasons for the limiting its application as a standard practice is lack of randomized clinical trials on its usefulness. As such, a conclusion on its usefulness in managing meningioma cannot be made. Preoperative embolisation may not be indicated for every patient with meningioma.

Keywords: Craniotomy

1. INTRODUCTION

Preliminary studies by different researchers show that preoperative embolisation could be important in the management of meningioma (1-7,9-11,13-20,22-30). Studies after studies have shown that it reduces blood loss, reduces surgical complications, improves surgical outcomes, reduced surgical time, easier resection (21-22), and softens tumors during subsequent resection (1-3, 6,9).

However, the procedure may also come with several risks such as cranial nerve deficit, hemorrhage, ischemic conditions, tumoral edema among others. This then points to the need to follow up on a possible neurological deficit (8).

Nevertheless, the actual benefits of preoperative embolisation remain very unclear, and the potential harm of any additional procedure is the reason its use has been limited for years. Additionally, with the high cost and risks of embolisation, the value of preoperative embolisation must be reconsidered for all cases of meningiomas. With this, it is apparent that neurological deficit and preoperative complications should be followed up in meningioma management.

This is a sensitive procedure; sadly, there have not been any randomized clinical trials on its usefulness in the management of meningiomas. As such, no significant conclusions on the general usefulness of the procedure have been made, and its use as a standard practice is thus still not authorized. Most researchers and authors are dependent on case series as evidence of its use in meningioma management.

Correspondence Author: Ria Margiana
Email address: margianaria@gmail.com
Received: 23-07-2018
Revised: 18-09-2018
Accepted: 12-11-2018
In this article, we review the importance of following up on the neurological deficit and preoperative embolization in the management of meningioma through a craniotomy.

2. Literature Review

2-1. Role of Preoperative Embolisation

Research and different authors report on the importance of preoperative embolization in the management of meningiomas through a craniotomy (1-6). Researchers through case series have been able to draw meaningful conclusions as to whether or not preoperative embolisation is important in the management of meningiomas (42). However, lack of randomized clinical trials on the usefulness of the procedure, and a possible high cost has limited its use.

Several researchers report that preoperative embolisation could be beneficial in reducing blood loss and therefore reduce blood transfusions. MacPherson (15) showed that when a study is conducted between two groups of patients, a study on a group of patients who had preoperative embolisation and on another where it is not done, the blood replacement was less in the embolised group compared to the group of patients who did not undergo preoperative embolisation. This seems to suggest that achieving a complete devascularisation could reduce the blood replacement requirement. This possibly confirms the argument by other authors that preoperative embolisation reduces blood loss during the management of meningioma (6,9,13,15,30-35). Blood loss is one of the implicated causes of complications after craniotomy. If enough studies were to be done on this and a significant conclusion be made on its importance, then possibly it will help in preventing possible post-operative complications after craniotomy.

Preoperative embolisation has also been shown to reduce surgical complications. In a study done by MacPherson (15), preoperative embolisation seems to reduce the possibility of surgical complications. In the study, 21% of patients who had preoperative embolisation performed had surgical complications compared to 54% of patients who had no preoperative embolisation done, registered surgical complications (15). This suggests that preoperative embolisation could be important in preventing surgical complications after craniotomy (20-24).

Other authors also have it that preoperative difficulty with bleeding is reduced among patients in whom preoperative embolisation is performed (22-24). In his research, Macpherson (15) reports that 25% of patients who had embolisation done to them, experienced difficulty with bleeding compared to 62% of those in the group where embolisation was not done. Even though there is no much research that has been done in this line, it is apparent that preoperative embolisation could reduce preoperative difficulty with bleeding.

According to some authors, the procedure is also likely to reduce surgery time (41). In a different study, preoperative embolisation was used to reduce intraoperative blood loss, shortens operation time, and reduce postoperative complications in a surgery done to an individual with neck paragangliomas (41). In a study done at Oulu University Hospital, a comparison of blood loss and time is taken for the surgery is made between patients who had preoperative embolisation performed against those who didn’t (41). The study findings show that the embolisation group had minimal intraoperative blood loss compared to those in the group where embolization was not done. Surgery time was also greatly reduced among patients from the embolised group compared to those from patients who never went through preoperative embolization. Apart from reducing blood loss and reducing the chances of postoperative complications, this study shows that this procedure may be helpful in shortening the time taken to perform a surgery of meningiomas (41).
3. Complications

There is plenty of literature on the complications regarding the procedure. Some of the documented complications include hemorrhage, ischemic heart conditions, cranial nerve deficit, tumoral edema among others (8,12,37).

Table 1 below shows some of the results from different researchers on the role of preoperative embolisation in the management of meningiomas and whether or not a follow up on the same and neurological deficit is important:

<table>
<thead>
<tr>
<th>Author</th>
<th>Number of patients</th>
<th>Blood loss on embolised group</th>
<th>Blood loss on embolised group</th>
<th>Surgery time</th>
<th>Surgery complication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singla et al.</td>
<td>Not clear</td>
<td>Less</td>
<td>High</td>
<td>Reduced on the embolised group</td>
<td>Reduced</td>
</tr>
</tbody>
</table>
4. Indications for Preoperative Embolisation

The most critical consideration is the indication for preoperative embolisation in meningiomas. The indications still remain unclear, and this is even made worse with lack of randomized clinical trials on its usefulness. Nevertheless, the surgeon’s preference and the healthcare facility practice and standards have been cited by many others as one of the determinants of whether or not the procedure should be performed. Waldron et al (16) are appreciated for their exclusion criteria for example history of stroke. Here, Waldron and other researchers apply the standard of practice before performing any procedure: comparing the risk-benefit ratio. Latchaw, a researcher, talks about five circumstances in which preoperative embolisation plays a big role in the management of meningiomas (13-14, 16-17, 19, 40). The five circumstances include large tumors, tumors involving the base of the skull, tumor involving scalp, tumor involving sinuses, and tumors next to cortex. According to Latchaw (17), these five circumstances may influence the decision to perform a preoperative embolisation on a patient.

5. Choice of Embolising Material

There are different embolising agents that are always used in the preoperative embolisation in meningiomas. The agents can either be liquid or solids. Some embolising agents produce temporary effects while others produce permanent effects (7,10,36,39). The embolising agents include PVA particles, cellulose beads, microspheres, fibrin glue among others. Notably, in most cases, PVA particles and microspheres are preferred.

6. Conclusion

Summing up, case series reveals positive impacts of preoperative embolisation in the management of meningiomas. However, lack of randomized clinical trials and therefore unclear usefulness and a possible high cost is limiting its use. Despite of that, preliminary studies have shown that it can reduce blood loss, easier resection, decreased surgical time (38), reduce surgery complications, improved outcome among other benefits.

The fact that preoperative embolisation has associated complications like the one listed above may not necessarily limit its application. This is because almost every medical procedure comes with complications.

Ideally speaking, human life is sacred and healthcare professionals took an oath to respect that. It is therefore important that any procedure that touches on the human life be declared safe. Preoperative embolisation may have some complications associated with it, but it equally has several benefits as discussed above. However, the fact that there is no data on randomized clinical trials, its use as a standard practice is not wide. Additionally, the available data and studies rely much on case series, and therefore may not provide adequate information on its usefulness in the management of meningiomas during craniotomy.

REFERENCES


