

## Giant Sphenopetroclival Meningioma in Developing Countries: A Challenging Services with Limitation Facilities and Cost Analysis

**Roland Sidabutar and Agung Budi Sutiono\***

*Department of Neurosurgery, Hasan Sadikin Hospital, Padjadjaran University, Bandung, Indonesia*

**\*Corresponding Author:** Agung Budi Sutiono, Department of Neurosurgery, Hasan Sadikin Hospital, Padjadjaran University, Bandung, Indonesia.

**Received:** December 04, 2021

**Published:** December 31, 2021

© All rights are reserved by **Roland Sidabutar and Agung Budi Sutiono.**

### Abstract

**Introduction:** The management of giant sphenopetroclival meningioma (SPCM) remains a hurdle for clinicians in many countries. The development of the instrument and surgical technique have improved the clinical outcomes, especially in developed countries. However, the limitation of facilities as well as the cost remains a major in developing countries, like Indonesia. Our study aims to modify the neurosurgical services of SPCM by considering the limited cost and facilities in our institution.

**Methods:** We collected the data of SPCM within the year 2019 and evaluated the surgical approaches, outcomes, and cost-effectiveness based on the national insurance in Indonesia. Nine patients of SPCM have been noted and analyzed, in 4 patients the lesions were located on the right, while 5 patients had lesions on the left side. CT and/or MRI with contrast imaging were used to determine the tumor invasion and location. All patients were covered by national insurance with a limited budget.

**Results:** Through the year 2019, we operated on 9 patients with SPCM. The majority of the patients were female (6 out of 9). The average age was 46.78 years old. In our series, 1 patient had prolonged stay in the ICU (20 days) with total length of stay (LOS) of 32 days. This patient took extra cost during hospitalization, with a total of 6378 USD. The average LOS in ICU and ward were 2.25 days and 7.38 days respectively, excluding the outlier patient. The mean cost for the surgery of SPCM was 3683.78 USD.

**Conclusion:** The study concludes that patients with SPCM are still manageable based on Indonesian National insurance system although with many limitation.

**Keywords:** Giant Sphenopetroclival Meningioma (SPCM); Length of Stay (LOS); Tumor

### Introduction

The meningioma, which attaches on the petroclival region is approximately 9% of all intracranial meningioma [1]. The main treatment for petroclival meningioma is surgery and followed by radiotherapy. The giant sphenopetroclival meningioma (SPCM) remains a challenge in many countries. The development of the instrument and surgical technique have improved the clinical outcomes, especially in developed countries. However, the limitation of facilities as well as the cost remains a major issue in developing countries,

like Indonesia. Our study aims to modify the neurosurgical services of giant SPCM by considering the limited cost and facilities in our institution.

Since December 31, 2013, Indonesia had implemented the national health insurance systems to cover all Indonesian, called BPJS (Social Insurance Administration Organization) and JKN (Indonesian National Health Insurance Systems). Despite the improvement of health care coverage, as neurosurgeons, we faced many challenges. Therefore, we analyzed the relation between outcome and

cost-effectiveness for surgical treatment of SPCM. Understanding the cost of microsurgical treatment of intracranial meningioma may offer direction in reducing health care costs and establishing cost-effective algorithms [2].

## Methods

We collect the data of SPCM within the year 2019 and evaluate the surgical approaches, outcomes, and cost-effectiveness based on the national insurance in Indonesia. Nine patients of SPCM have been noted and analyzed, in 4 patients the lesions were located on the right side, while 5 patients had lesions on the left side. CT and/or MRI with contrast imaging were used to determine the tumor invasion and location. All patients were covered by national insurance with a limited budget.

## Results

Within the year 2019, we operated on nine patients with SPCM. Majority of the patients were female (6 out of 9). The average age was 46.78 years old. In this series, 1 patient had prolonged stay in the ICU (20 days) with total length of stay (LOS) of 32 days. This patient took extra cost during hospitalization, with a total of 6378 USD. The average LOS in ICU and ward were 2.25 days and 7.38 days respectively, excluding the outlier patient. The mean cost was 3683.78 USD and it could be cheaper if the outlier patient was excluded due to over budgeting. The summary of clinical data was presented as table 1.

No	Location	Gender	Age	Size (cm)	Insurance BPJS (USD)	Outcome	LOS in ICU	Total LOS
1	Right	Male	45	6.1x6.7	3421	PTR	2	7
2	Right	Male	38	6.4x7.1	3367	PTR	2	7
3	Right	Female	55	7.3x7.0	3554	PTR	2	8
4	Right	Female	52	5.8x6.8	3241	NTR	3	9
5	Left	Female	48	6.5x6.6	6378	PTR	20	32
6	Left	Male	51	6.4x5.7	3143	PTR	2	7
7	Left	Female	35	7.1x5.6	3422	PTR	3	7
8	Left	Female	49	5.4x6.3	3365	PTR	2	7
9	Left	Female	48	6.2x7.4	3263	PTR	2	7

**Table 1:** Number of patient characteristics.

Note: PTR (Partial total removal), NTR (nearly total removal), LOS (Length of stay), ICU (Intensive care unit), BPJS (Social Insurance Administration Organization).

The management of SPCM is complicated by their proximity to intracranial neurovascular structures hence a complete resection may pose a risk of worsening morbidity. We realized that achieving a total removal was very dangerous, therefore we did partial total removal on 8 patients and 1 with nearly total removal.

The tumor diameter of more than 6 cm was classified as giant SPCM. A giant SPCM commonly encased the neurovascular structures in that region, therefore it is impossible for the total removal. Encasement of the internal carotid artery, especially with our limited facilities. In our institution, there was no availability of intraoperative neuro-monitoring, neuro-navigation, intraoperative

hybrid with DSA operating room, which were needed to facilitate giant SPCM surgery. In addition, microsurgical clipping was also not available in our institution. Nevertheless, the other devices were existing, such as surgical microscopes, high-speed drill and ultrasonic aspirator.

The other issue was the availability of ICU, due to the limitation of the number of beds and ventilators, the surgery for SPCM might have to be postponed. Hence, prolonged the LOS and created additional costs.

**Figure 1:** A giant sphenopetroclival meningioma.

## Discussion

We investigated the management of SPCMs by considering the cost of our National Health insurance and the limitation of sophisticated equipment. As previously described, SPCM is a very challenging case for neurosurgeons. There are many issues about the cost-effectiveness in managing meningioma, it is not only the surgical treatment but also the other sections in one package for patient treatment. The issues include the cost of imaging studies, pathological studies and others [3-6].

The limitation of equipment creates an additional challenge for the surgery of giant SCPM, we roughly took 7-15 hours for the surgery of SCPM. The longer surgical duration is associated with an additional cost in anesthetic drugs. Generally, cost distribution of facility, pharmacy, supplies/implants, imaging, and laboratory costs did not differ significantly depending on the patient-perceived outcome [4]. Fortunately, a preliminary imaging study with a contrast-CT scan is feasible in other hospitals, this could minimize the cost for the surgical package. Vinding, *et al.* also considered the cost of health care when it was not so useful in assessing the patient whether it was for imaging or immunohistochemistry staining. Therefore their study was trying to make new grading systems for resection skull base meningiomas [7]. This idea encourages us to make such a kind of grading system for cost-effectiveness in SPCM however, we need more data to analyze it. The average cost was higher in patients with a pre-operative KPS (Karnowsky performance score) score lower than 80. The outcome of intracranial-meningioma resection in elderly individuals is also more favorable when the pre-operative KPS score is >80. Treatment should be patient-specific, and additional factors should be considered. Patients with poor pre-operative clinical conditions might benefit from a combined strategy with partial resection and radiosurgery to reduce the surgical duration and the complication

rate [8]. Therefore in our series the average age is 46.78 years old, which means the KPS is >80. Partial removal is the best choice for us to avoid severe and deathly complications and the other reason is that the cost will be effective because of no overbudgeting. The average LOS in ICU and ward were 2.25 days and 7.38 days respectively, excluding the outlier patient. The mean cost was 3683.78 USD and it could be cheaper if the outlier was excluded.

## Conclusion

The study concludes that patients with SPCM are still manageable based on Indonesian National insurance system although with many limitation.

## Bibliography

1. Osakwe O and Rizvi S. "Social aspects of drug discovery, development, and commercialization" (2016).
2. Parvathaneni V., *et al.* "Drug repurposing: a promising tool to accelerate the drug discovery". *Drug Discovery Today* 24.10 (2019): 2076-2085.
3. Research and Markets. "Drug repurposing service providers market, 2020-2030" (2020).
4. Murteira S., *et al.* "Drug reformulations and repositioning in pharmaceutical industry and its impact on market access: reassessment of nomenclature". *Journal of Market Access and Health Policy* 1.1 (2013).
5. The US FDA. "Learn about drug and device approvals" (2018).
6. Dhir N., *et al.* "Drug repurposing and orphan disease therapeutics". *Intech Open Book Series* (2020).
7. Li YY and Jones S. "Drug repositioning for personalized medicine". *Genome Medicine* 4 (2012): 27.
8. ACCORDING TO A NEW STUDY, Terry M. "The median cost of bringing a drug to market is \$985 million". *Biospace* (2020).
9. Rudrapal M., *et al.* "Drug repurposing (DR): An emerging approach in drug discovery". *Intech Open Book Series* (2020).
10. Pillaiyar T., *et al.* "A medicinal chemistry perspective of drug repositioning: Recent advances and challenges in drug discovery". *European Journal of Medicinal Chemistry* 195 (2020).
11. Chen H., *et al.* "Scaffold repurposing old drugs towards new cancer drug discovery". *Current Topics in Medicinal Chemistry* 16.19 (2016): 2107-2014.

12. Stewart J. "Actemra FDA approval history" (2021).
13. Ghofrani H., *et al.* "Sildenafil: from angina to erectile dysfunction to pulmonary hypertension and beyond". *Nature Reviews Drug Discovery* 5 (2006): 689-702.
14. Thayer A M. "Drug repurposing: finding new uses for approved drugs and shelved drug candidates is gaining steam as a pharmaceutical development strategy". 90.40 (2012).
15. Ashburn TT and Thor K B. "Drug repositioning: identifying and developing new uses for existing drugs". *Nature Review Drug Discovery* 3.8 (2004): 673-683.
16. Karaman B., *et al.* "Computational drug repurposing: current Trends". *Current Medicinal Chemistry* 26.28 (2019): 5389-5409.
17. Park K. "A review of computational drug repurposing". *Translational and Clinical Pharmacology* 27.2 (2019): 59-63.
18. Surrogate Endpoints to accelerate orphan drug approval.
19. The US FDA. "Guidance for industry: applications covered by section 505 (b) (2)" (1999).
20. EMA. "European medicines agency procedural advice for users of the centralized procedure for generic/hybrid applications". 2021 version.
21. US FDA. "NDA and BLA calendar year approvals".
22. US FDA, CDER. "Determining whether to submit an ANDA or a 505 (b) (2) application" (2019).
23. Rolland B., *et al.* "France approves baclofen for alcohol dependence". *Alcohol Alcohol* 55.1 (2020): 44-45.
24. Bayoumy A B., *et al.* "Unrealized potential of drug repositioning in Europe during COVID-19 and beyond: a physician's perspective". *Expert Opinion on Drug Discovery* 16.8 (2021).
25. Gil C and Martinez A. "Is drug repurposing the future of drug discovery, or is innovation indeed the way forward". *Expert Opinion on Drug Discovery* 16.8 (2021): 829-831.

### Assets from publication with us

- Prompt Acknowledgement after receiving the article
- Thorough Double blinded peer review
- Rapid Publication
- Issue of Publication Certificate
- High visibility of your Published work

**Website:** [www.actascientific.com/](http://www.actascientific.com/)

**Submit Article:** [www.actascientific.com/submission.php](http://www.actascientific.com/submission.php)

**Email us:** [editor@actascientific.com](mailto:editor@actascientific.com)

**Contact us:** +91 9182824667