



Retrospective study of complications in patients with intracranial aneurysms after clipping vs. coiling

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METHODOLOGY

A retrospective chart review study was performed in sixteen patients with intracranial aneurysms who underwent either surgical clipping (8 patients) or endovascular coiling (8 patients) at Memorial Hermann Southwest Hospital from January 2022 to April 2023. Patients’ demographics (including age and gender); intraoperative and perioperative details during the patient’s time in the hospital (such as aneurysm sites, specifics of treatment, and nature of complications, if any); and post-operational conditions in follow-up appointments/imaging were reviewed with the physician, and the findings were documented. Angiograms and CTA scans for each patient were also examined. This information was obtained from Memorial Hermann’s patient databases, including Ambra Health. The neurosurgical team, comprising the neurosurgeon and neurosurgical nurse practitioner, were interviewed using a semi-structured set of questions to supplement this data. The qualitative interviews conveyed their perspectives and techniques for the management of intracranial aneurysms.

CONCLUSIONS & DISCUSSION

Figure 2 and Figure 3 reveal that of the 16 patients (8 coiling patients and 8 clipping patients) the vast majority were female and the highest number of patients were within the age range of 61-70 years. However, this does not indicate correlation between patients with this demographic and aneurysm occurrence, as study is severely limited due to a small sample size. Figure 4 shows that only 31.25% of patients experienced any significant complication after their aneurysm treatments. Figure 5 and Figure 6 portray a comparison between the incidence of postoperative complications for patients who had clipping procedures versus coiling procedures. 3/8 (37.5%) coiling patients and 2/8 (25%) clipping patients experienced complications after their respective procedures. However, the conclusion cannot be made that this is a statistically significant difference in overall complication due to the sample size consisting of less than thirty patients. Figure 1 allows us to analyze and compare the specific nature of complications after these procedures. Allowing for the limitations of the small data size, our study shows that the incidence of aneurysm recurrence is higher after endovascular coiling than surgical clipping. Review of literature supports our finding. It has been reported that up to 21-34% of intracranial aneurysms may recur after coil embolization of aneurysms (3-5). A semi-structured interview with the neurosurgeon Dr. JC, who has performed about 500 coiling and 500 clipping procedures for patients with intracranial aneurysms, also supported this idea, as he also opined that in his experience, recurrence of intracranial aneurysm tends to be significantly higher in patients who undergo aneurysm coiling compared to aneurysm clipping. The exact mechanism of aneurysm recurrence in this setting is not yet fully understood. Some authors have hypothesized that coil compaction may be a causative factor in aneurysm recurrence post coil embolization of intracranial aneurysms (6). However, other factors including size of the aneurysm, rate of aneurysmal sac growth, ruptured versus unruptured status of the aneurysm may also play a role in aneurysm recurrence post treatment (7).

In our study, only two patients out of the 16 developed vasospasm as a complication, and both the patients had undergone aneurysm clipping; none of the patients who underwent aneurysm coiling had vasospasm in our study. Review of scientific literature shows that the incidence of cerebral vasospasms associated with intracranial aneurysms are very rare, particularly in unruptured aneurysms (8). Vasospasm after aneurysm clipping may manifest early, typically within hours after the surgery. The early vasospasm following surgical clipping of aneurysms is currently thought to be related to mechanical stress secondary to surgical manipulation. However, delayed vasospasm may manifest in up to 2.5% of the patients, and can occur anytime from 5–28 days following surgery (9-10). Given the rarity, the precise etiology for the delayed vasospasm in these patient cohort is not fully elucidated but various factors including increased edema, rebleeding of remnant, hydrocephalus, infection, hyponatremia, hypoxemia, cortical spreading depressions may be contributory to this complication (10-11).

My initial prediction was proven partially correct. It is seen that out of the 8 reviewed patients who had surgically clipping, 2 patients had delayed vasospasm days after surgery, and since this cannot be categorized as an intraprocedural complication, my individual research does not support that surgical clipping yields higher incidence of intraprocedural complication, though other studies can be sourced to argue this. However, out of the 8 reviewed patients who had coiling of their aneurysms, 2 out of the 3 who presented with complications had residual/recurrent aneurysms, meaning the aspect of my predication stating that coiling may lead to higher occurrence of complication weeks after treatment was supported by my study.

RESULTS

Patient #	Patient Age	Patient Sex	Vessel	Type of Treatment	Complication	Type of Complication
1	40	F	Superior cerebellar and basilar artery	Coiling	Y	Significant residual superior cerebelar artery aneurysm
2	46	F	Other	Coiling	N	
3	66	F	Ophthalmic artery	Coiling	N	
4	56	F	Posterior cerebral artery	Coiling	Y	Significant regrowth of aneurysm
5	66	M	Cavernous right internal carotid artery	Coiling	N	
6	57	M	Basilar/Anterior inferior cerebellar artery	Coiling	N	
7	71	F	Posterior communicating artery	Coiling	N	
8	71	M	Other	Clipping	Y	Left sided groin hematoma (not directly related to coiling)
9	42	F	Choroidal artery and basilar artery	Clipping	Y	Right middle cerebral artery stroke from vasospasm
10	66	F	Anterior communicating artery	Clipping	N	
11	46	F	Middle cerebral artery	Clipping	N	
12	63	F	Recurrent basilar artery aneurysm, posterior communicating artery, middle cerebral artery	Clipping	N	
13	33	F	Middle cerebral artery	Clipping	N	
14	61	F	Posterior communicating artery	Clipping	N	
15	67	F	Middle cerebral artery	Clipping	N	
16	43	F	Anterior communicating artery	Clipping	Y	Vasospasm but no stroke

Figure 1

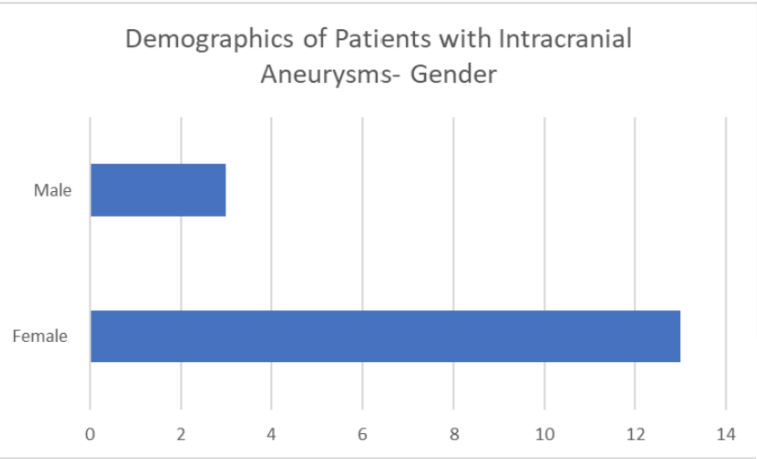


Figure 2

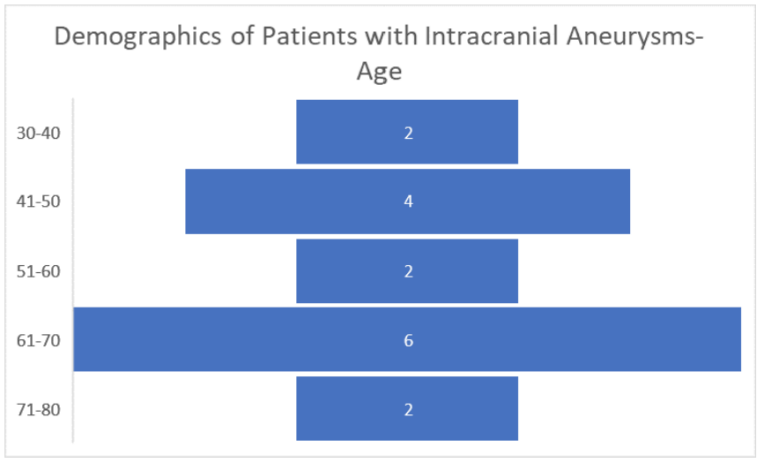


Figure 3

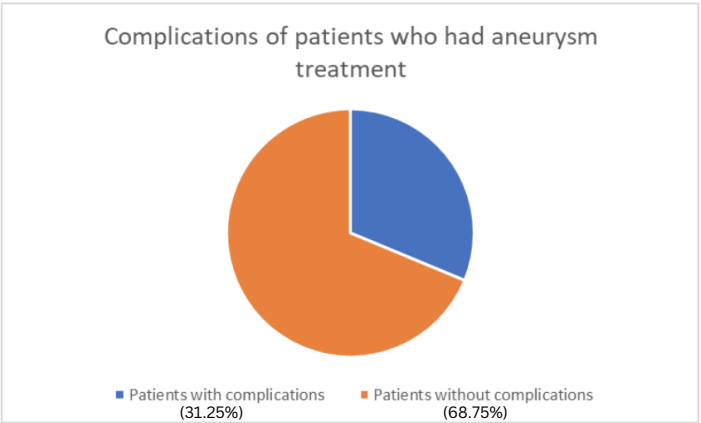


Figure 4

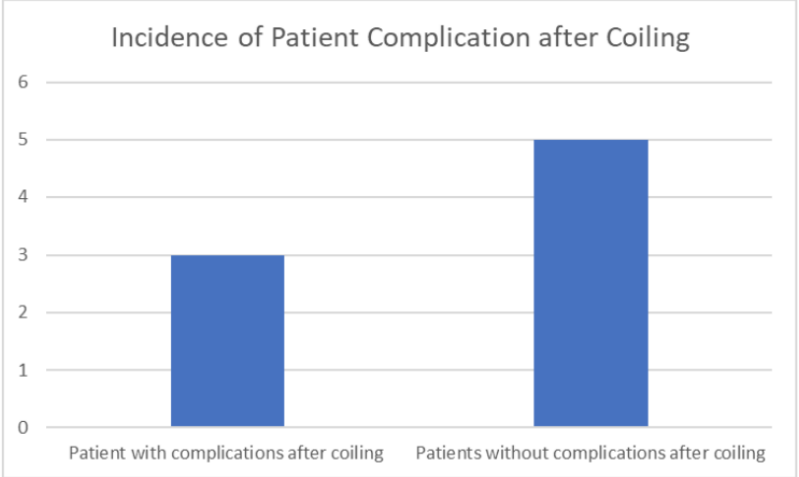


Figure 5

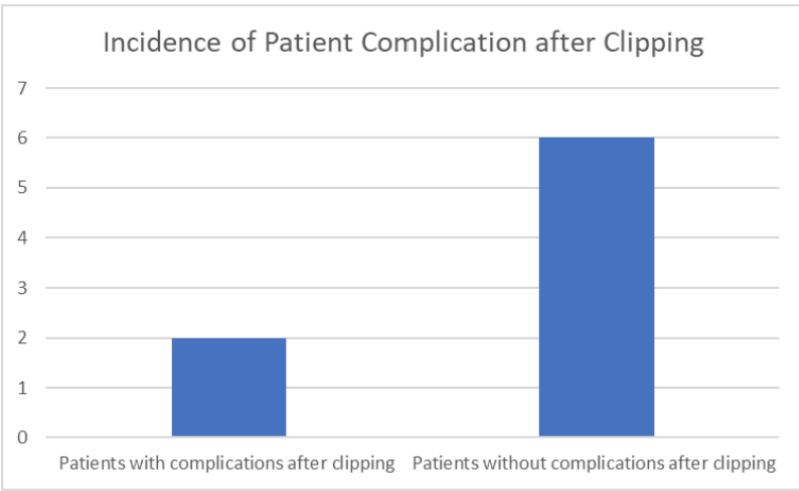


Figure 6

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