



ГАУЗ «Межрегиональный клинико-диагностический центр», г.Казань

Зачем использовать минидоступ в хирургии аневризм?

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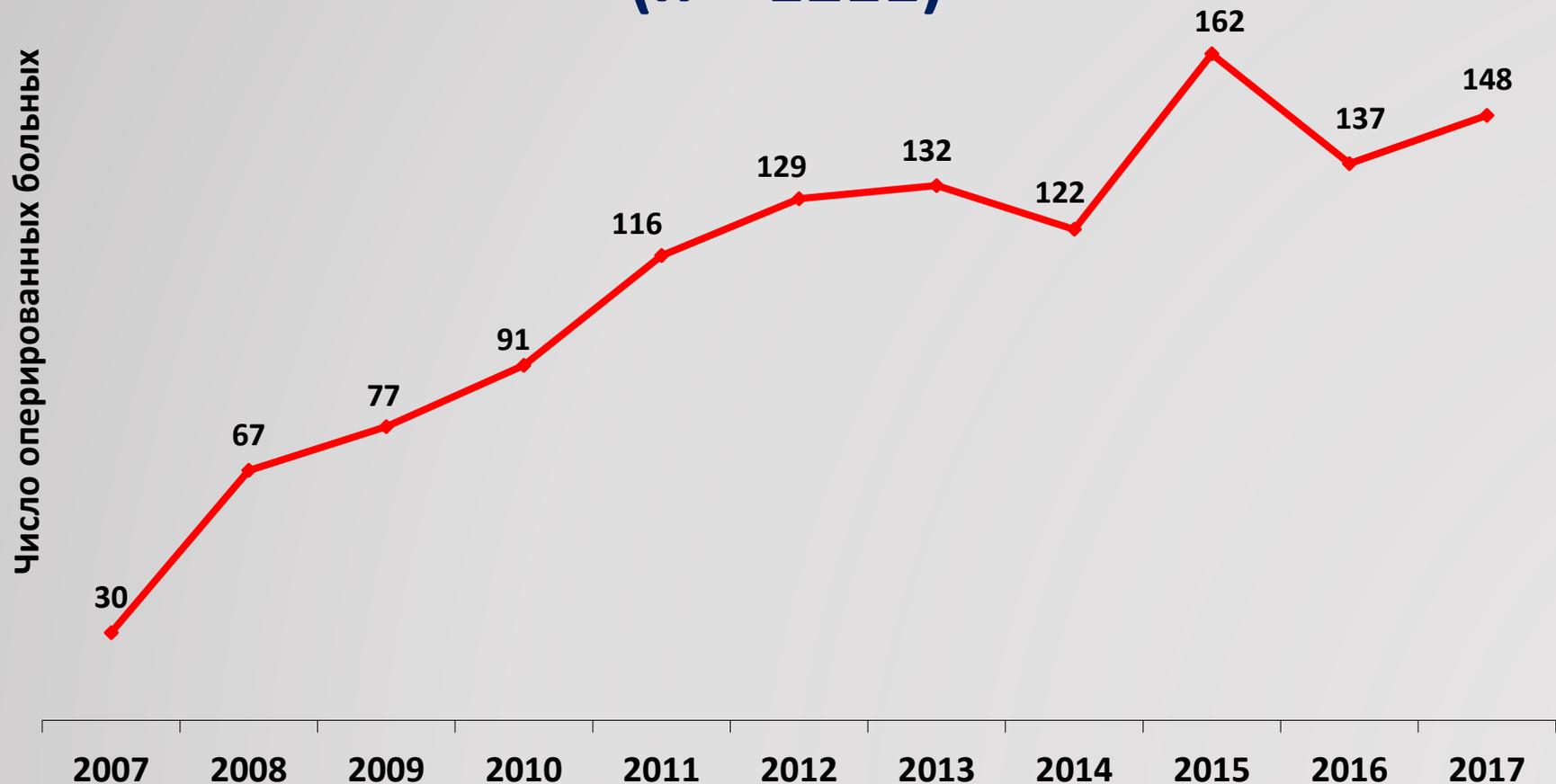


Санкт-Петербург, 2018



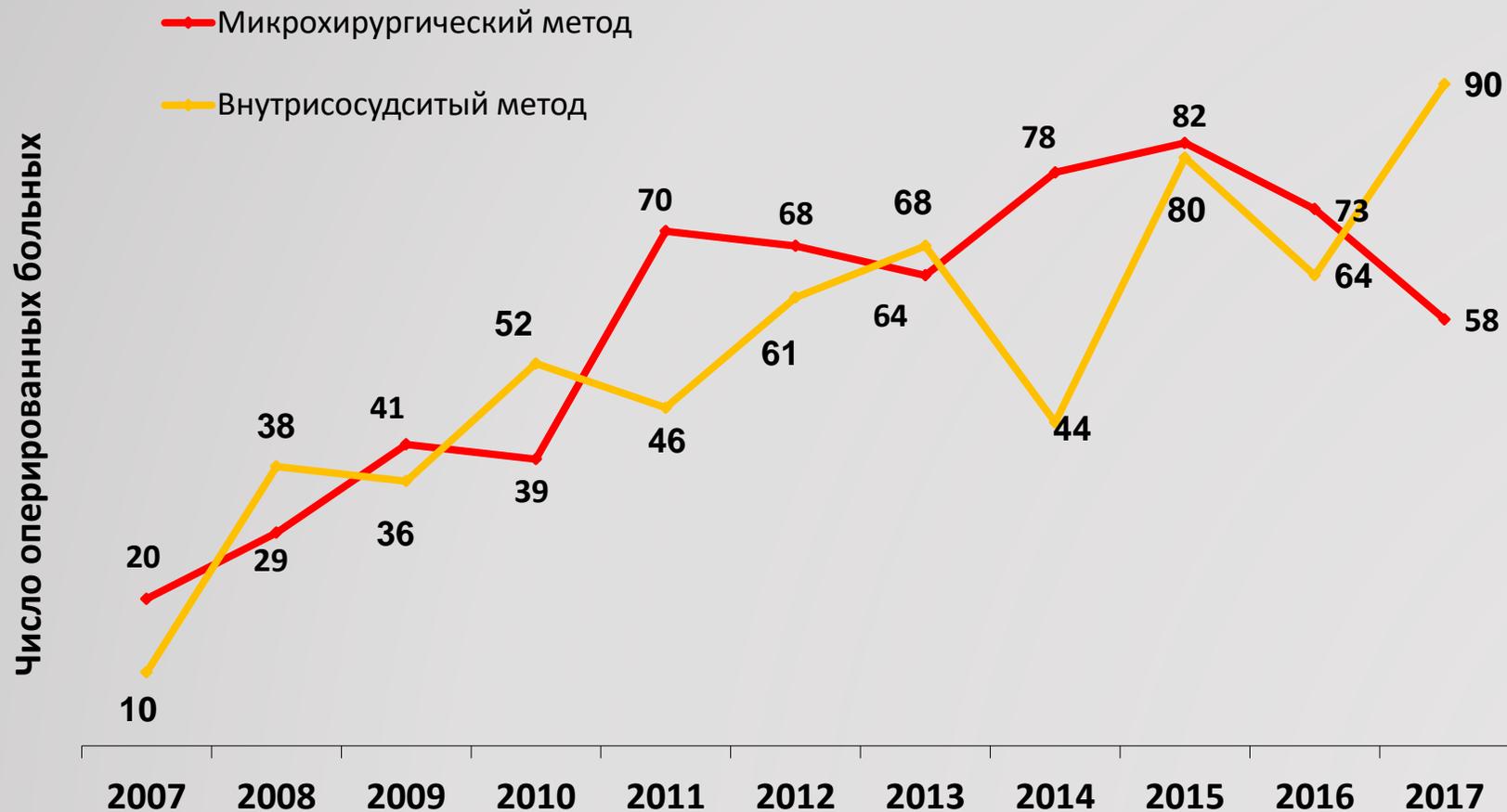


Динамика числа пациентов с аневризмами артерий головного мозга, оперированных в 2007 – 2017 гг. (n = 1211)





Динамика числа пациентов с аневризмами артерий головного мозга, оперированных микрохирургическим (n = 622) и внутрисосудистым (n = 589) методами в 2007 – 2017 гг.





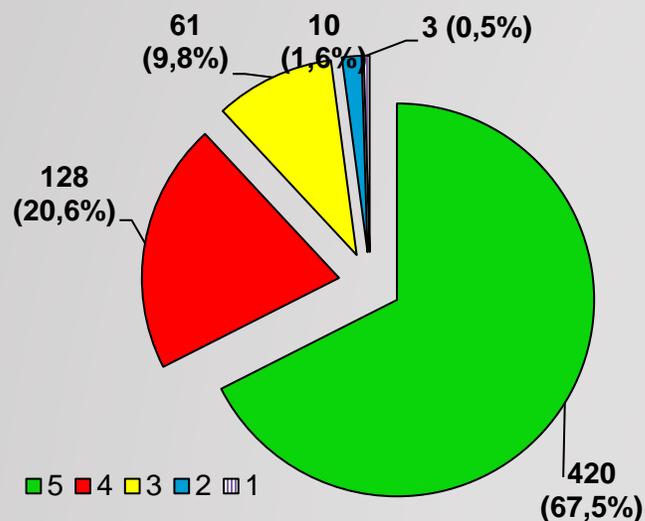
Число пациентов с разорвавшимися и неразорвавшимися аневризмами, оперированных в 2007 – 2017 гг.

Аневризмы	Число пациентов (%)
Разорвавшиеся	820 (67,7%)
• Острый период (14 дней)	344 (41,9% от всех разорвавшихся)
• «Холодный» период	476 (58,1% от всех разорвавшихся)
Неразорвавшиеся	391 (32,3%)
ВСЕГО:	1211
<i>в том числе – множественные</i>	<i>236 (19,5%)</i>

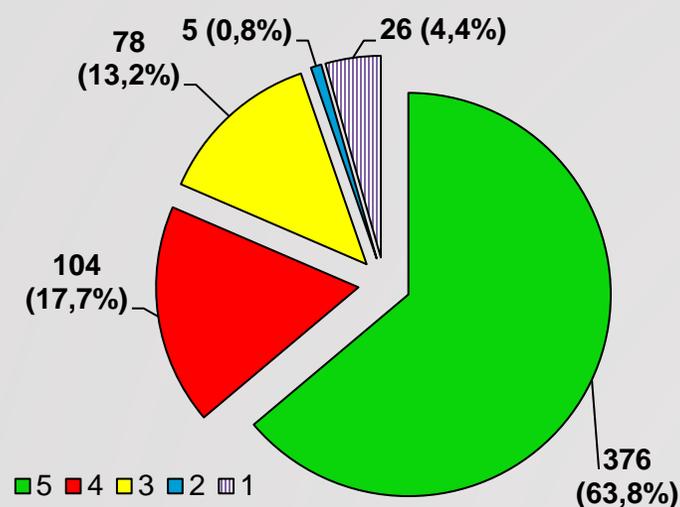


Результаты операций в 2007 – 2017 гг. (n = 1211)

- Благоприятные исходы (4 и 5 баллов по шкале исходов Глазго) при выписке - 1028 (84,9%) больных
- Летальные исходы - 29 (2,4%) пациентов:
 - после открытых вмешательств – 3 (0,5%) пациента
 - после эндоваскулярных вмешательств – 26 (4,4%) больных



Открытые

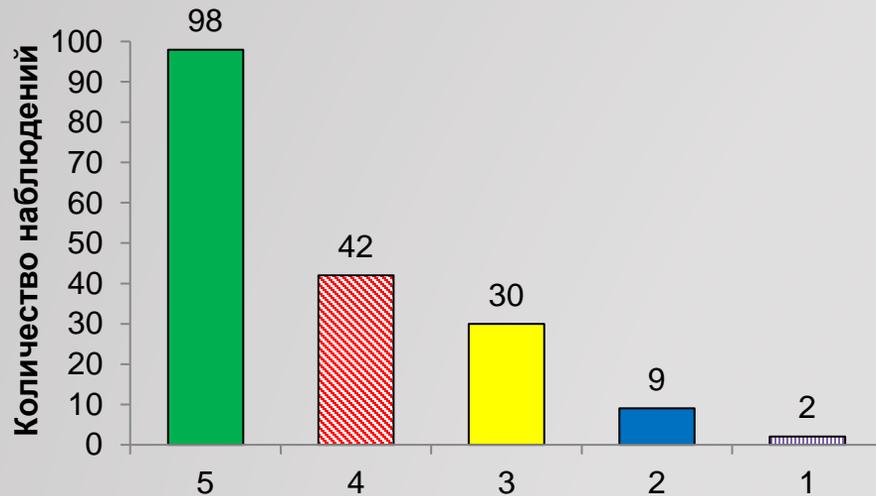


Эндоваскулярные

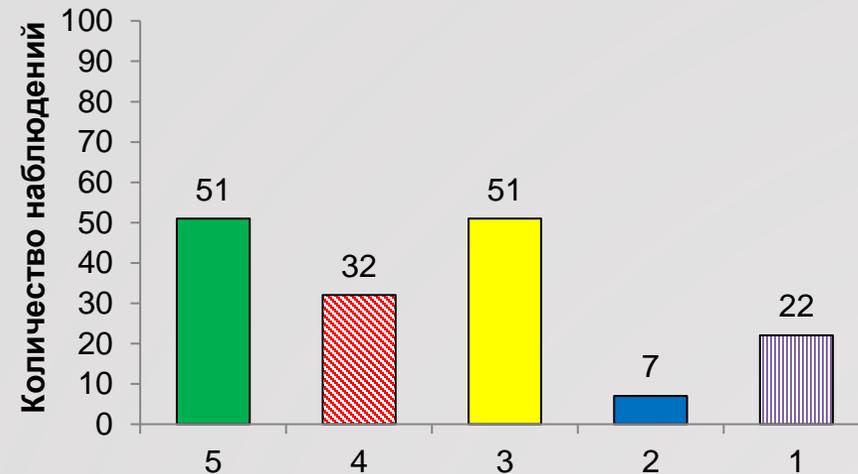
Оценка результатов хирургического лечения по шкале исходов Глазго



Результаты лечения пациентов с разорвавшимися аневризмами в остром периоде по шкале исходов Глазго $\Sigma = 344$ (42,0%)



Результаты лечения больных с разорвавшимися
аневризмами (микрохирургический метод, n=181)



Результаты лечения больных с разорвавшимися
аневризмами (внутрисосудистый метод, n=163)

Послеоперационная летальность - 24 (6,8%) пациентов

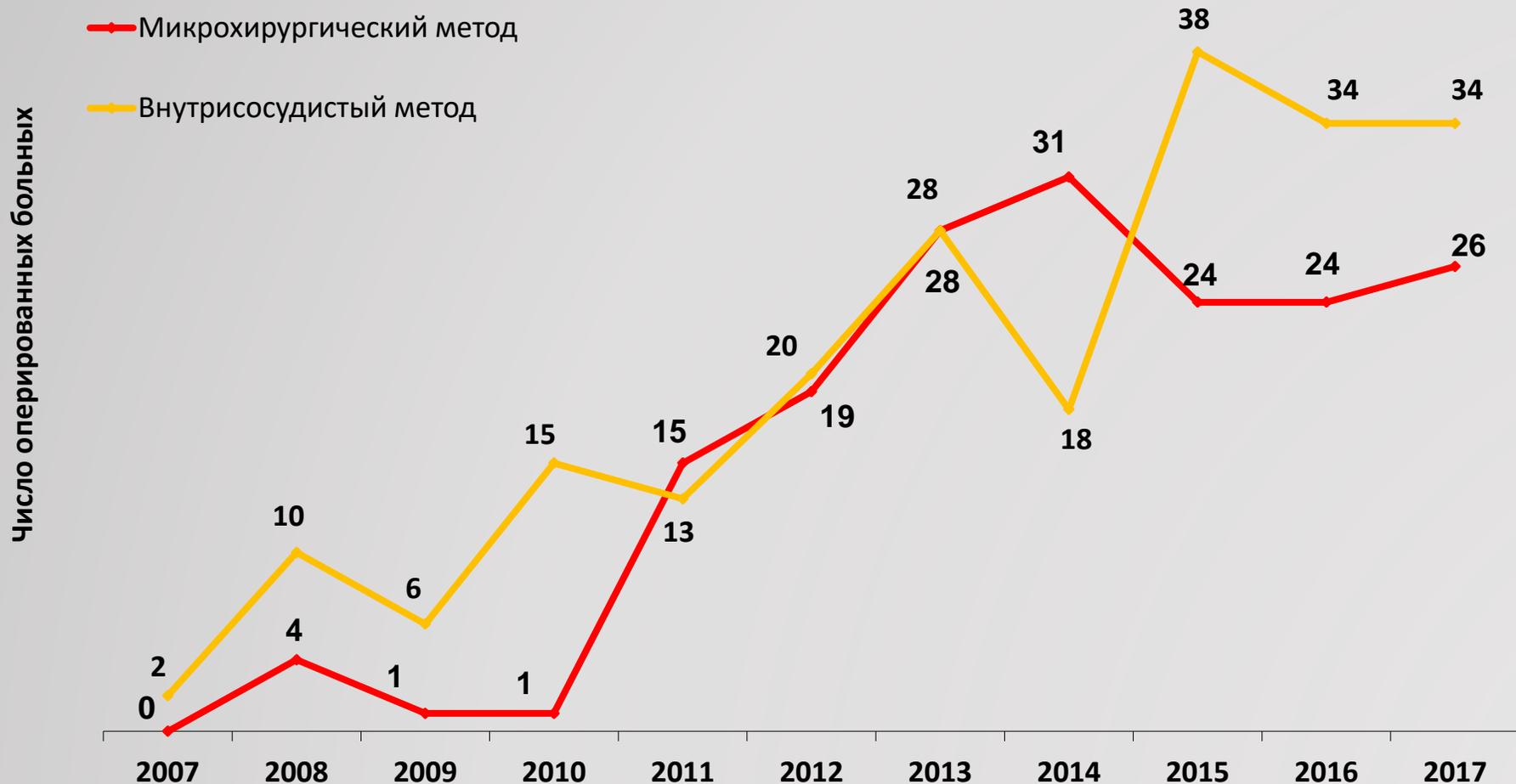


К вопросу о показаниях к хирургическому лечению неразорвавшиеся аневризм

- Из 820 пациентов с разорвавшимися аневризмами у **188 (22,9%)** больных были аневризмы размером до 5 мм

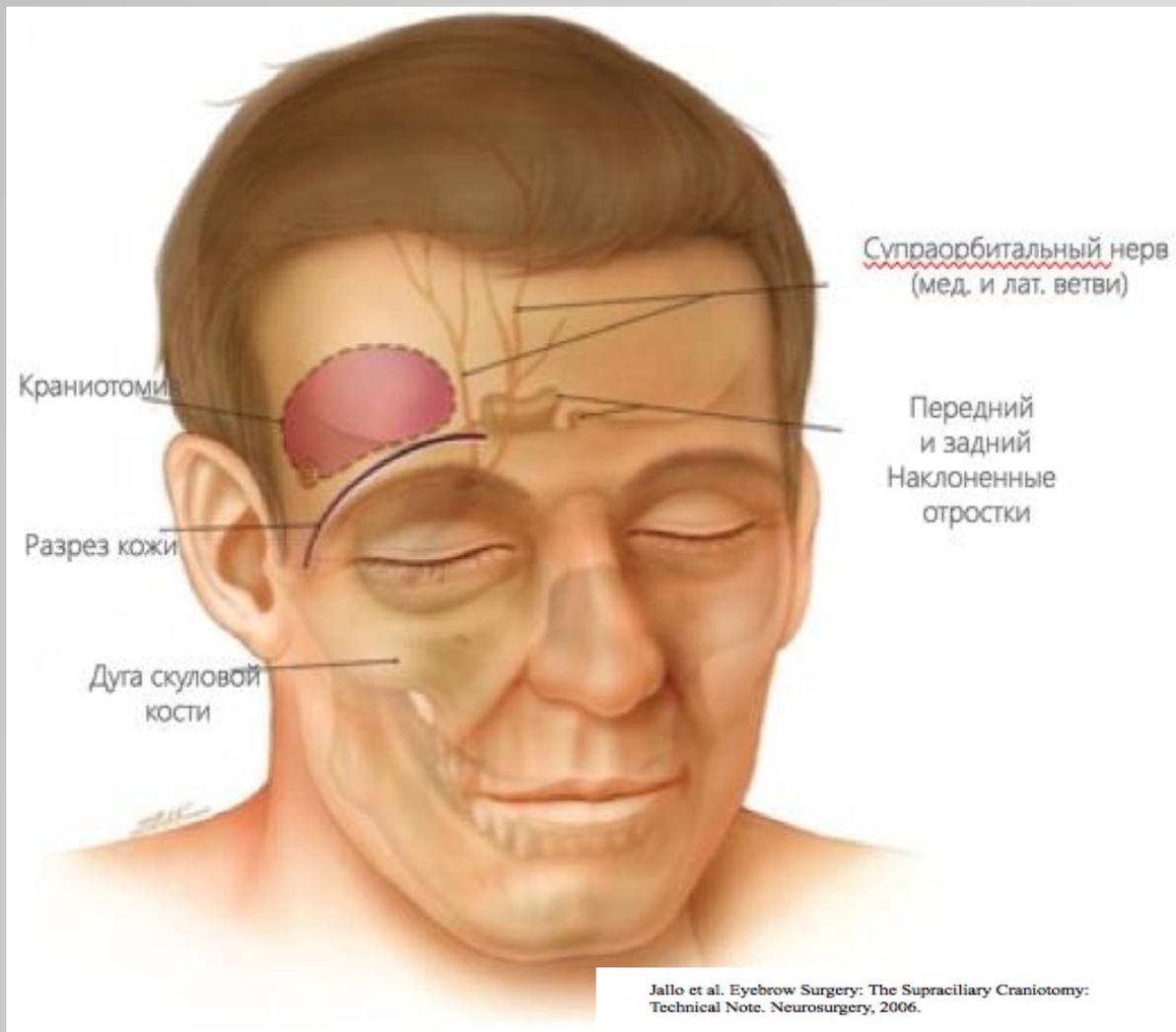


Динамика числа открытых и эндоваскулярных пособий у больных с неразорвавшимися аневризмами $\Sigma = 391$ (32,3%)

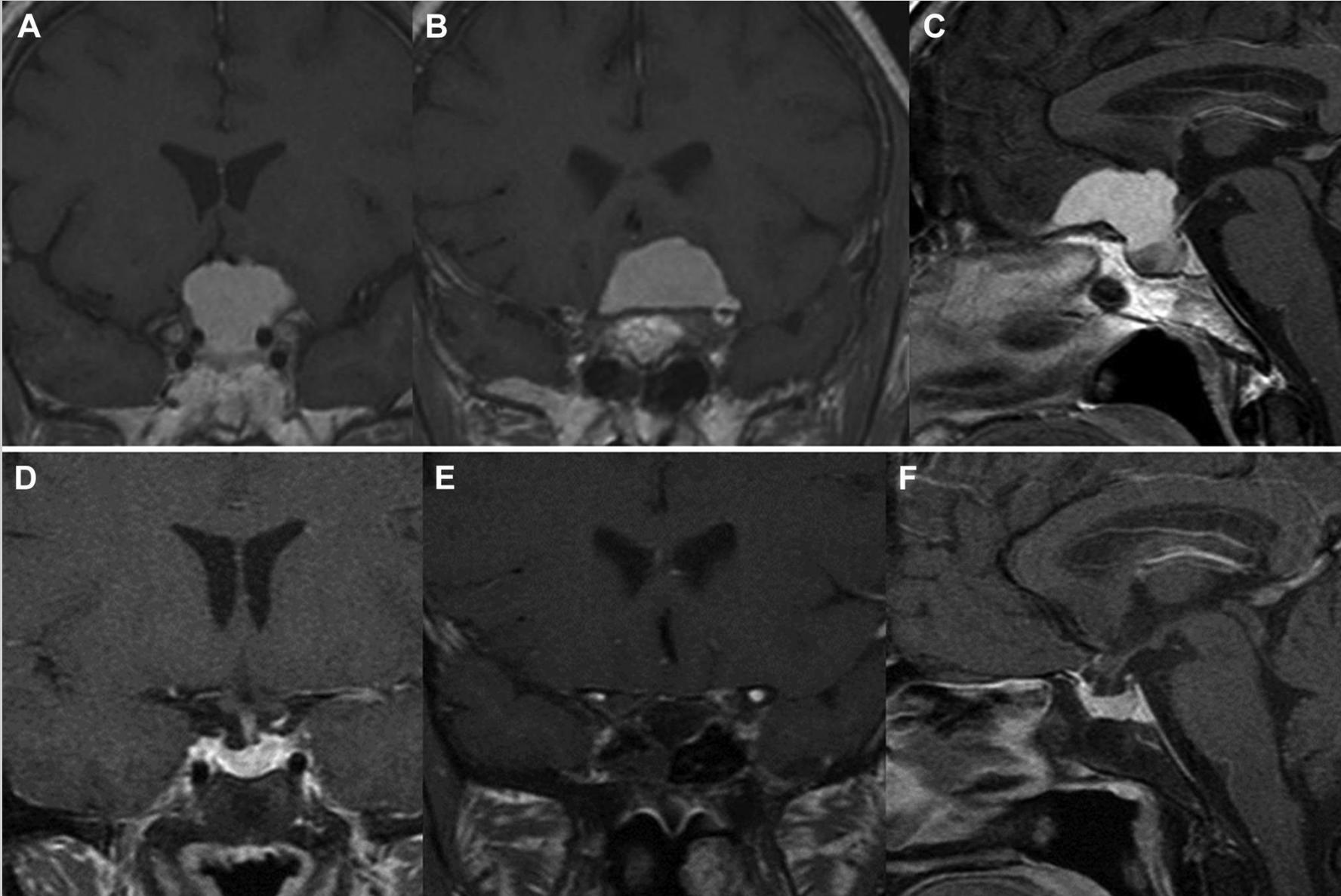


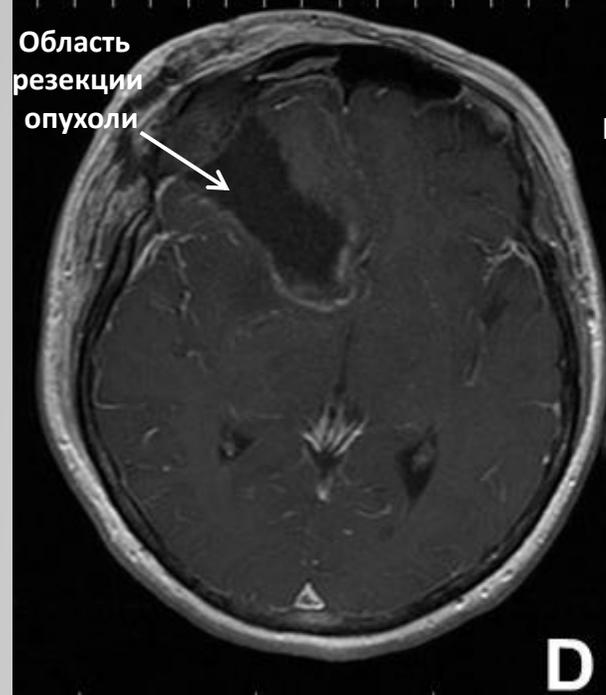
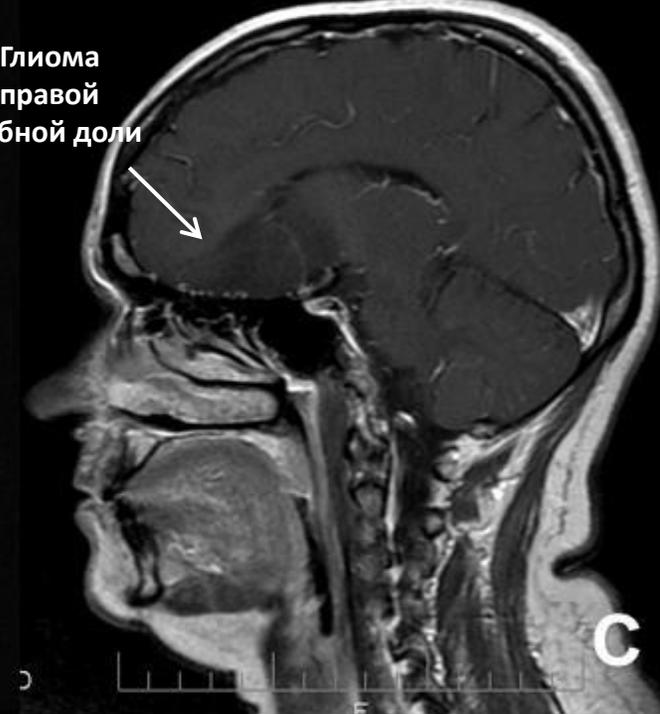
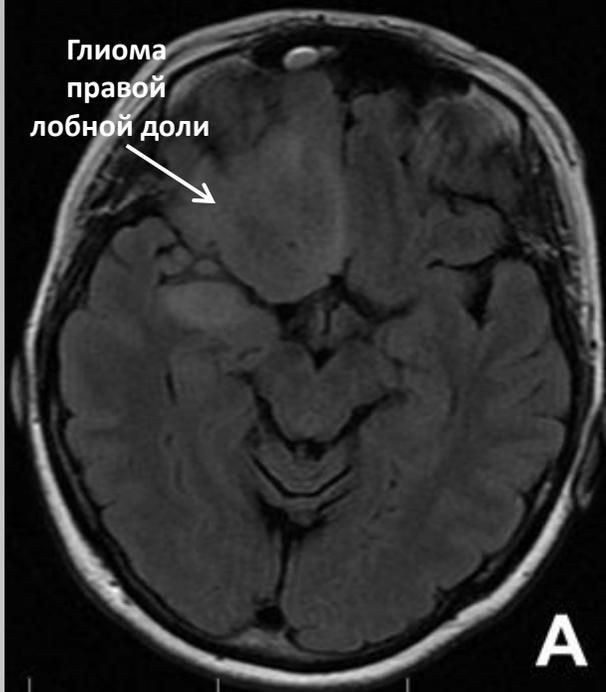


Супраорбитальный трансбровный keyhole доступ



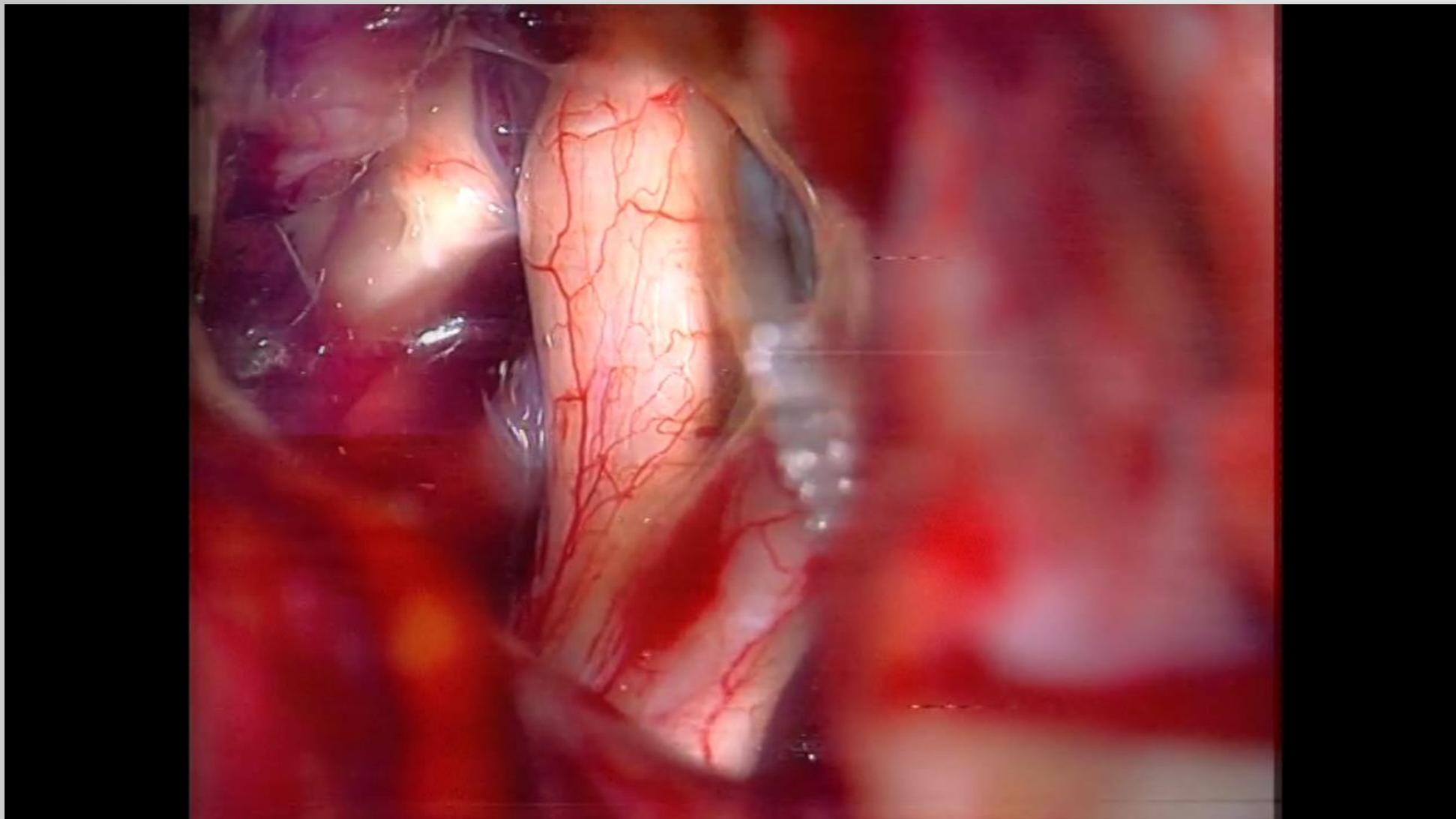
	супраорбитальный трансбровный доступ, n
Аневризмы	66
Менингиомы	39
Глиомы	3
Итого	108







Обзор при правосторонней супраорбитальной трансбровной краниотомии



Математически доказано, что нет различий в обзоре структур основания черепа

SURGICAL ANATOMY

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AN ANATOMICAL EVALUATION OF THE MINI-SUPRAORBITAL APPROACH AND COMPARISON WITH STANDARD CRANIOTOMIES

OBJECTIVE: To compare anatomically the surgical exposure provided by pterional (PT), orbitozygomatic (OZ), and minisupraorbital (SO) craniotomies.

METHODS: Seven sides of six fixed cadaver heads injected with silicone were used. The mini-SO craniotomy followed by the PT and OZ approaches were performed sequentially. The bony flaps were attached with miniplates and screws, allowing easy conversion between the approaches. A frameless stereotactic device was used to calculate an area of surgical exposure and the angles of approach for six different anatomic targets. An image guidance system was used to demonstrate the limits of the surgical exposure for each technique.

RESULTS: No significant differences were observed in the total area of surgical exposure when comparing the mini-SO ($A = 1831.2 \pm 415.3 \text{ mm}^2$), PT ($A = 1860.0 \pm 617.2 \text{ mm}^2$), and OZ approaches ($A = 1843.3 \pm 358.1 \text{ mm}^2$; $P > 0.05$). Angular exposure was greater for the OZ and PT approaches than for the mini-SO approach, either in the vertical and horizontal axes, considering all of the six targets studied ($P < 0.05$). Except for the distal segment of the ipsilateral sylvian fissure, no practical differences in the limits of the exposure were detected.

CONCLUSION: The mini-SO approach may offer a similar surgical window compared with that provided by standard craniotomies and constitutes an alternative to the OZ and PT craniotomies in selected patients. Selection should be based primarily on the area to be exposed, but rather on the working angle anticipated to be required. The key point is to use the most adequate technique for a particular patient, rather than using a one-size-fits-all approach for all patients.

KEY WORDS: Anatomic study, Minimally invasive neurosurgery, Orbitozygomatic craniotomy, Supraorbital craniotomy

Neurosurgery 59(ONS Suppl 4):ONS-212-ONS-220, 2006

DOI: 10.1227/01.NEU.00001

The pterional (PT) craniotomy is probably the most used approach in neurosurgery. It provides access to lesions located in the anterior and posterior cerebral circulation, sellar and parasellar regions, cavernous sinus, orbital fissure, and orbit (20). Although its versatility has made it popular, the approach does require substantial temporalis muscle mobilization even in patients in whom the temporal part of the craniotomy is not needed.

The keyhole supraorbital (SO) craniotomy is another approach to the same region that has gained increasing acceptance. Several authors have reported their experience and

technical nuances and have also come using this craniotomy approach with satisfactory results (3, 6, 8–19). It has been routinely using a variety of craniotomy in which the orbitozygomatic part of the zygomatic arch is moved, called the supraorbital orbitozygomatic craniotomy. This approach lesions located in the cavernous sinus and its environs, including the sylvian fissure (1). However, controversy exists regarding whether this technique provides a satisfactory surgical exposure compared with conventional craniotomies as the PT and orbitozygomatic

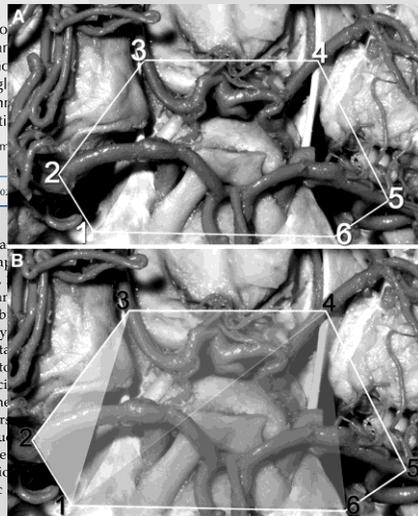


FIGURE 2. A, diagram showing the area within which the exposure was quantified, using readily available anatomic landmarks. Six points were selected to measure the area of surgical exposure: 1, a point just lateral to the superior orbital fissure in the ipsilateral sphenoid ridge; 2, ipsilateral MCA bifurcation; 3, most distal point of the ipsilateral PCA; 4, most distal point of the contralateral PCA; 5, most distal point of the contralateral MCA; 6, most lateral point of the contralateral sphenoid ridge. B, diagram demonstrating the method for calculating the area of exposure by dividing the area into six triangles.

J Neurosurg 113:975–981, 2010

Image-guided anatomical and morphometric study of supraorbital and transorbital minicraniotomies to the sellar and perisellar regions: comparison with standard techniques

Laboratory investigation

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Object. Minimally invasive approaches have been proposed for the treatment of anterior cranial base pathology. Whereas earlier studies have quantified surgical exposure by referring to the opening on the surface, this cadaveric morphometric study redefines the concept of working area by examining the deep exposures afforded by several different approaches. Specifically, the authors systematically quantify and compare the operative exposure afforded by the pterional, supraorbital, and transorbital keyhole approaches to the sellar, parasellar, and perisellar regions, including the anterior communicating artery complex.

Methods. Pterional, supraorbital, and transorbital approaches were performed on 6 cadaveric heads on both sides. Preoperative and navigation and measurements. Using reproducible methods, the authors measured the depth of the surgical window, depth of the surgical window, and the area of exposure. Heron's formula was used to calculate the area of exposure. The area of exposure was measured by dividing the area into six triangles whose boundaries were defined by the landmarks. The area of exposure was measured by dividing the area into six triangles whose boundaries were defined by the landmarks.

Results. The pterional, supraorbital, and transorbital approaches provided similar working areas. The transorbital approach was associated with a larger working area compared with the pterional approach ($p < 0.01$). The transorbital approach provided a larger working area compared with the supraorbital approach (56.6% increase in the supraorbital view).

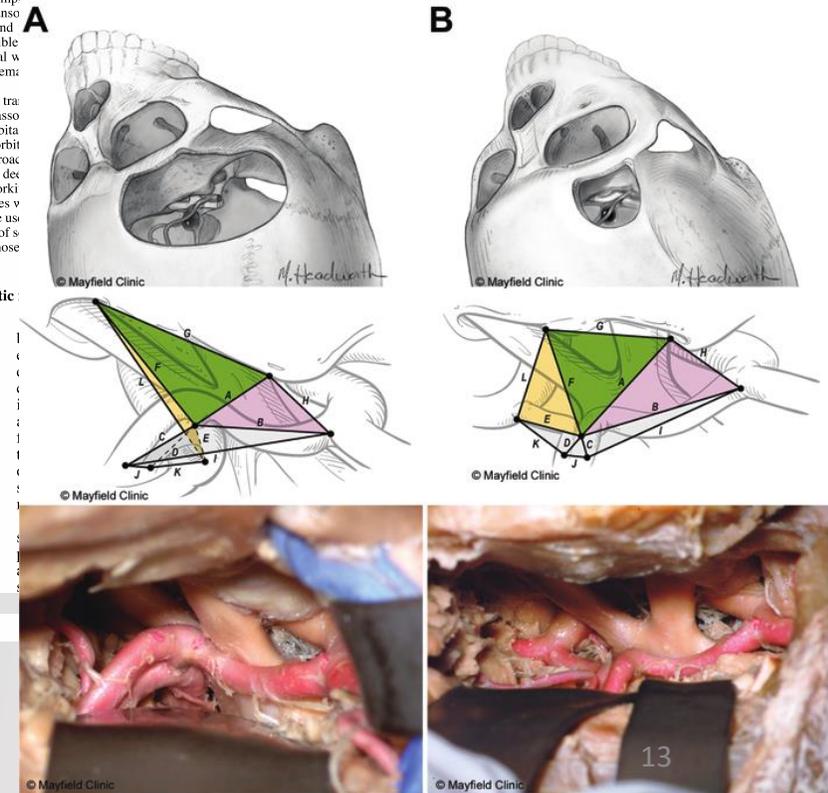
Conclusions. In refining the concept of working area, the authors' morphometric findings support the use of the pterional approach for the treatment of anterior cranial base pathology. The advantages of minimal invasiveness with those of the pterional approach.

KEY WORDS: pterional approach, supraorbital approach, transorbital approach, stereotactic

The pterional approach described by Yasargil^{19,40} is perhaps the most often used neurosurgical approach, especially for lesions located in the anterior, middle, and posterior fossae. However, the pterional approach sometimes provides suboptimal exposure, particularly when dealing with pathologies that are deeply located, such as aneurysms of the ACoA complex.^{3,4,7–9,14,18} Consequently, sylvian fissure dissection and/or brain retraction are usually needed to improve exposure, thereby increasing the risk of surgical morbidity.^{3,5,6,15,27,29,36} Cranial base approaches were developed to overcome these difficulties and to improve the exposure of deeply located structures without causing significant brain retraction.

Abbreviations used in this paper: ACA = anterior cerebral artery; ACoA = anterior communicating artery.

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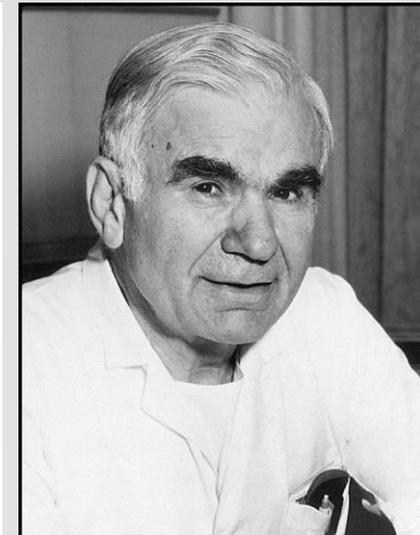
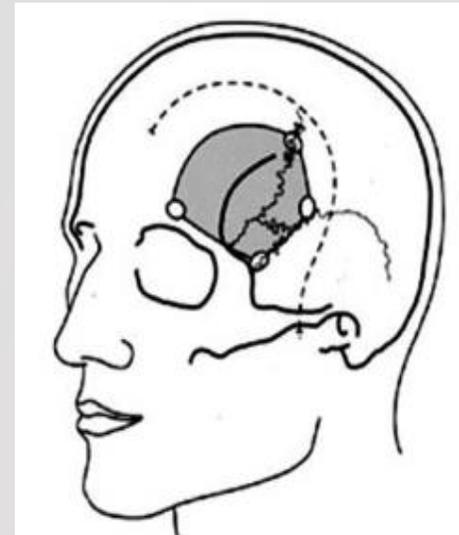
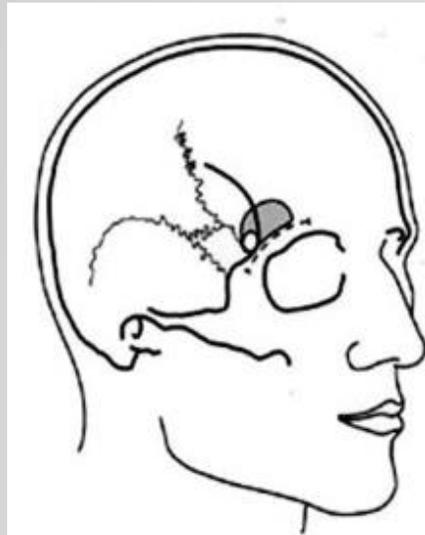


Цель исследования

- Определить **ЭФФЕКТИВНОСТЬ** и **БЕЗОПАСНОСТЬ** **супраорбитального трансбровного доступа** в клипировании разорвавшихся и неразорвавшихся аневризм в сравнении с **птериональным доступом**



A. Pernezcky



G. Yasargil

Surgical Treatment of Ruptured Anterior Circulation Aneurysms: Comparison of Pterional and Supraorbital Keyhole Approaches

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Congress of Neurological Surgeons

BACKGROUND: Recent advancements in microsurgical techniques and instrumentation have allowed the development of the keyhole approach in aneurysm surgery.

OBJECTIVE: To compare the safety, efficacy, and 1-year clinical outcome of supraorbital keyhole and standard pterional approaches for ruptured anterior circulation aneurysms.

METHODS: A total of 87 patients underwent surgical clipping, 40 through the pterional and 47 through the supraorbital keyhole approach. Baseline demographics, operative time, procedural complications, and 1-year patient outcome were retrospectively compared.

RESULTS: The 2 groups were comparable with respect to baseline characteristics, with the exception of a higher proportion of small aneurysms (<7 mm) in the supraorbital group (70.2% vs 37.5%, $P = .002$). Total operative time was significantly shorter in the supraorbital group (205 minutes, $P < .001$) compared with the pterional group (256 minutes). The rate of procedural complications was lower in patients treated through the pterional (17.5%) vs the supraorbital approach (23.4%, $P = .4$). Intraoperative aneurysm ruptures occurred more frequently in the supraorbital group (10.6% vs 2.5%). No patient experienced early or late rebleeding in either group. One year after treatment, 75% (30/40) of patients achieved a favorable outcome (Glasgow Outcome Scale IV or V) in the pterional group vs 76.6% (36/47) in the supraorbital group ($P = .8$).

CONCLUSION: The rate of procedural complications may be higher with the supraorbital keyhole approach, but overall patient outcomes appear to be comparable. The pterional approach is a simple, reliable, and efficient procedure. The keyhole approach may be an acceptable alternative for neurosurgeons who have gained sufficient experience with the technique, especially for small noncomplex aneurysms.

KEY WORDS: Aneurysm, Pterional, Supraorbital



Критерии включения

1. Возраст **18 – 70 лет**
2. **Локализация аневризм** - передняя циркуляция выше офтальмического сегмента ВСА до уровней А2 ПМА и М3 СМА
3. Размеры аневризмы **3-20 мм**
4. Степень тяжести **< III по шкале Hunt-Hess**
5. Степень выраженности САК по классификации **Fisher < 3**
6. Открытое клипирование аневризмы
7. Ноябрь 2013 г. - декабрь 2016 г.

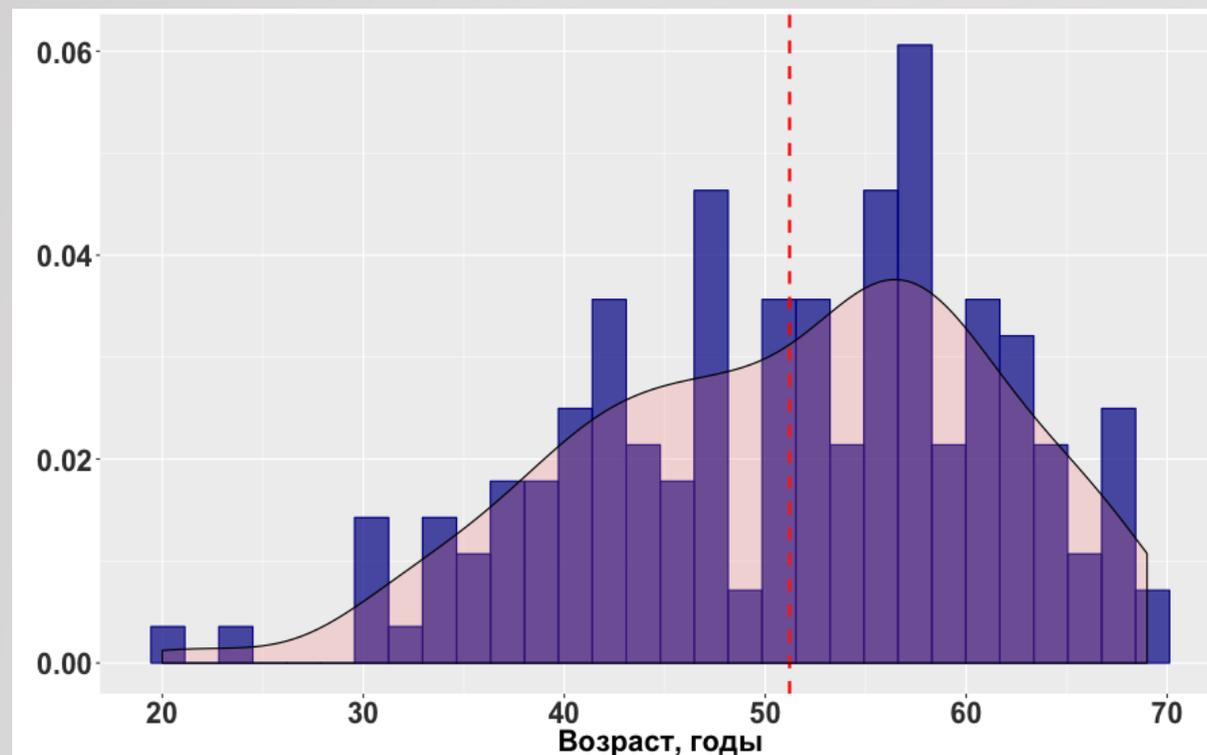
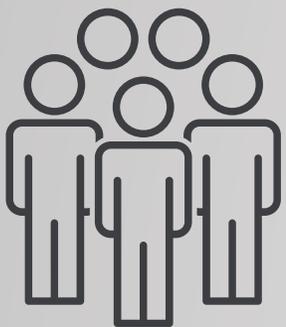
РЕЗУЛЬТАТЫ ПЕРВОГО ЭТАПА ИССЛЕДОВАНИЯ

166 пациентов

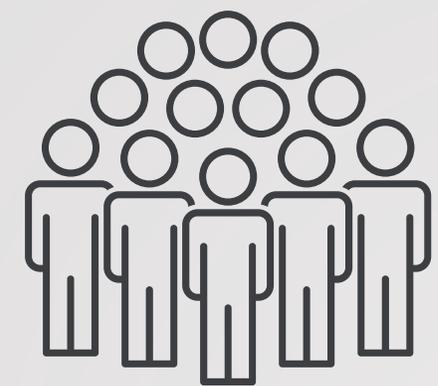
75 ♂ и 91 ♀

Средний возраст - $51,2 \pm 10,2$ год (от 31 – 69 лет)

Супраорбитальный
n = 49



Птериональный
n = 117



Характеристика пациентов с аневризмами

	Супраорбитальный n=49		Птериональный n=117		P - value
Пол	♂ = 23 ♀ = 26	46% 54%	♂ = 52 ♀ = 65	44,5% 55,5%	0,9
Возраст	50,8 ± 10,0		51,3 ± 10,4		0,702
Аневризма ВСА	3	6,1%	18	15%	0,3
Аневризма ПМА-ПСА	27	55,1%	53	45%	
Аневризма СМА	15	30,6%	37	32%	
Множественные аневризмы	4	8,2%	9	8%	

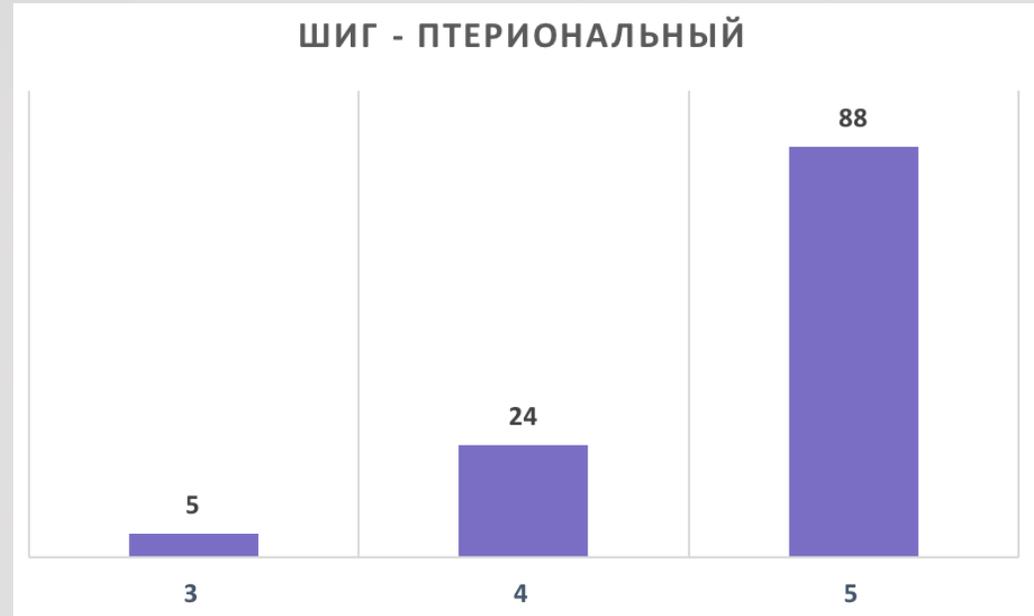
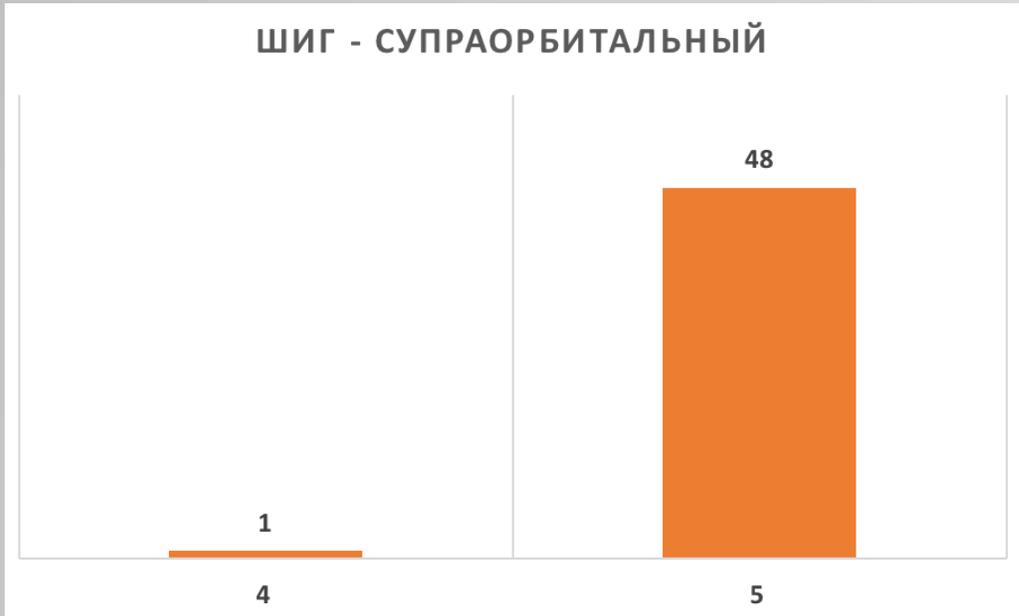
Характеристики аневризм

	Супраорбитальный n=49		Птериональный n=117		P - value
Размер аневризмы	7,2 ± 3,3 мм 4 -18 мм		6,7 ± 2,9 мм 4-16 мм		0,25
Разорвавшиеся	28	57,1%	75	64,1%	0,02
Неразорвавшиеся	21	42,9%	42	35,9%	
Острый период САК	7	14,3%	38	32,5%	0,02
Hunt-Hess I	12	24,5%	44	37,5%	
Hunt-Hess II	6	12,3%	22	18,8%	
Hunt-Hess III	3	6,1%	9	7,7%	

Результаты лечения пациентов с аневризмами с использованием супраорбитального трансбровного и птерионального доступов

	Супраорбитальный n = 49	Птериональный n = 117	P - value
1. Длительность операции	144,6 ± 32,3 мин	154,9 ± 38,9	0,158
2. Интраоперационный разрыв аневризмы	8 (16,3%)	15 (12,8%)	0,073
3. Операционная кровопотеря	109,5 ± 73,4 мл	216,7 ± 96 мл	0,0000006
3. Вскрытие лобной пазухи	9 (18%)	0 (0%)	0,0035
4. Нарастание неврологического дефицита	2 (4,1%)	17 (14,5%)	0,003
5. Постоперационные геморрагические осложнения	1 (2%)	11 (9,4%)	0,003
6. Развитие эпилептических приступов после операции	0 (0%)	11 (9,4%)	0,0035

Исходы по шкале исходов Глазго



- В обеих группах **летальных исходов не было**
- Статистически значимой связи дооперационного разрыва
- аневризмы и исходов по ШИГ не выявлено

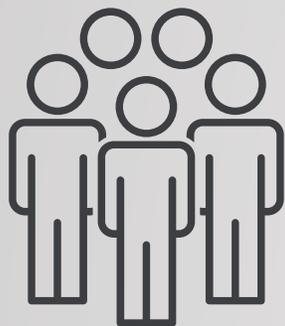
p = 0,0006

РЕЗУЛЬТАТЫ ВТОРОГО ЭТАПА ИССЛЕДОВАНИЯ

Анализ с использованием методологии случай-контроль ("case-control")

Для 37 пациентов в группе супраорбитального доступа был подобран идентичный пациент из группы птерионального доступа в пропорции 1:1

Супраорбитальный
n = 37



=

Птериональный
n = 37

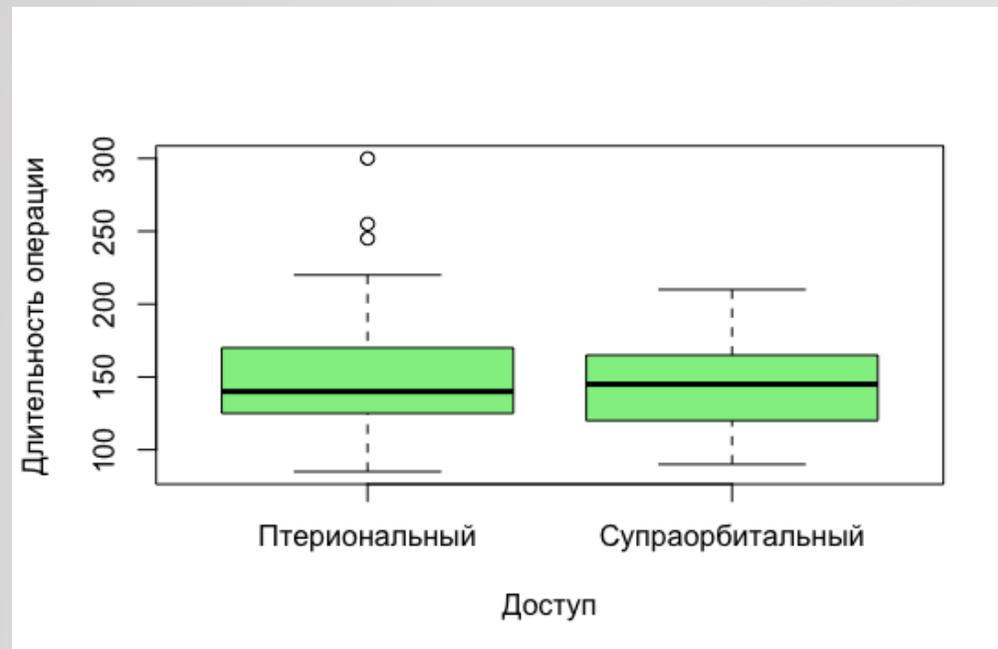


Характеристика пациентов с аневризмами

	Супраорбитальный, n=37		Птериональный, n=37		P - value
Пол	♂ = 18 ♀ = 19	48,5% 51,5%	♂ = 18 ♀ = 19	48,5% 51,5%	0,9
Возраст	52,1 ± 9,38		52,1 ± 9,38		0,702
Аневризма ВСА	2	5,4%	2	5,4%	0,25
Аневризма ПМА-ПСА	22	59,5%	22	59,5%	
Аневризма СМА	13	35,1%	13	35,1%	
Неразорвавшиеся	21	57,1%	21	57,1%	0,02
Разорвавшиеся	16	42,9%	16	42,9%	0,02
Острый период САК	7	18,9%	7	18,9%	0,02
Hunt-Hess I	8	21,6%	8	21,6%	
Hunt-Hess II	7	19%	7	19%	
Hunt-Hess III	1	2,7%	1	2,7%	

Длительность операции

Супраорбитальный n = 37	Птериональный n = 37	P - value
145,0 ± 32,8 мин	153,5 ± 47,9 мин	0,778
90 – 210 мин	85 – 300 мин	



Частота интраоперационного разрыва аневризм

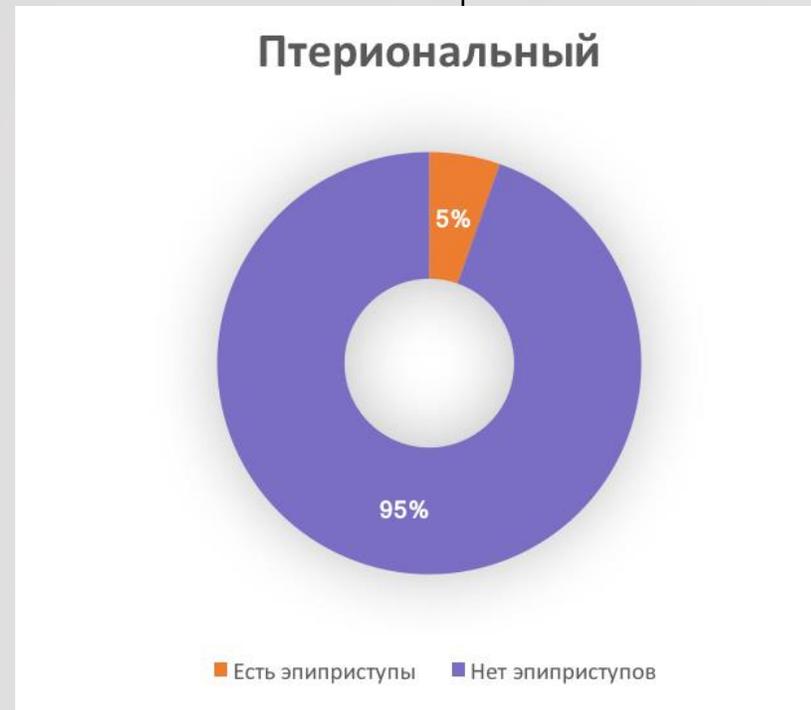
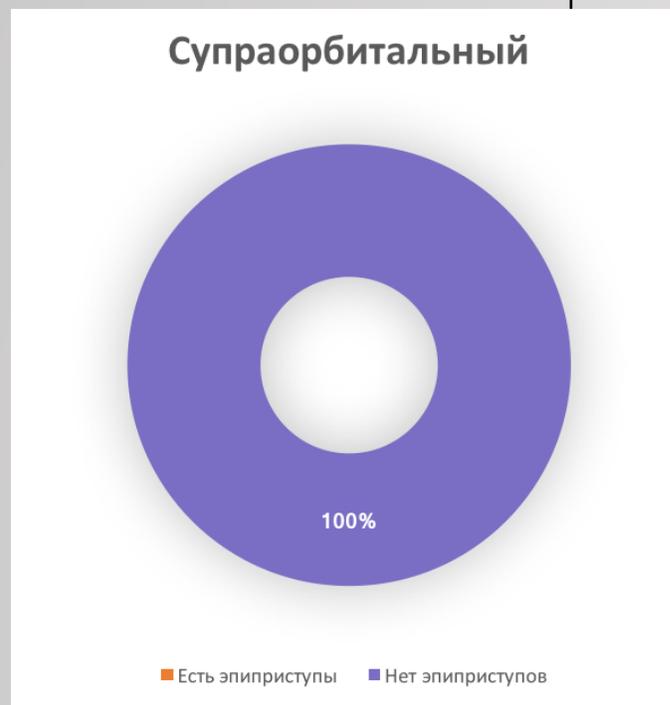
	Супраорбитальный n = 37	Птериональный n = 37	P-value
Аневризма ПМА-ПСА	4 (10,8%)	4 (10,8%)	0,1
Аневризма СМА	1 (2,7%)	2 (5,4%)	
Итого	5 (13,5%)	6 (16,2%)	

Частота развития неврологического дефицита и геморрагических осложнений

	Супраорбитальный n = 37	Птериональный n = 37	P - value
Нарастание неврологического дефицита после операции	2 (5,4%)	3 (8,1%)	0,115
Постоперационные геморрагические и ишемические осложнения	1 (2,7%) 0	7 (18,9%) 3 (8,1%)	0,0557 0,24

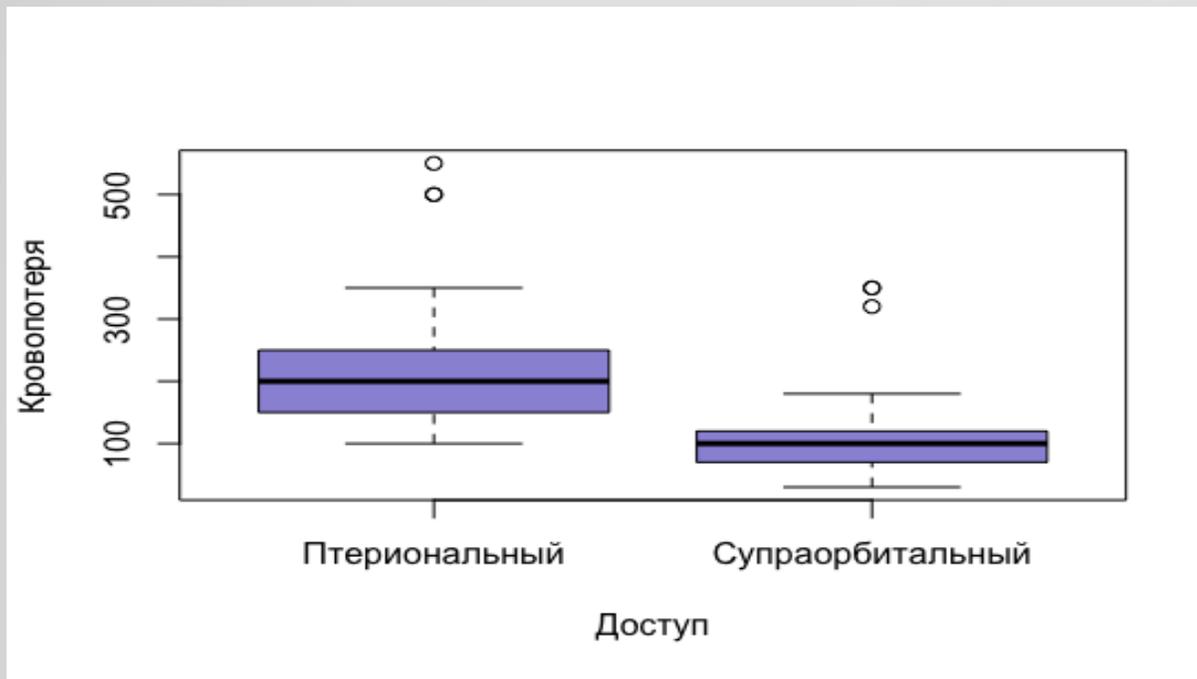
Частота развития эпилептических приступов в раннем послеоперационном периоде

Супраорбитальный n = 37	Птериональный n = 37	P - value
0 (0%)	2 (5,4%)	0,493



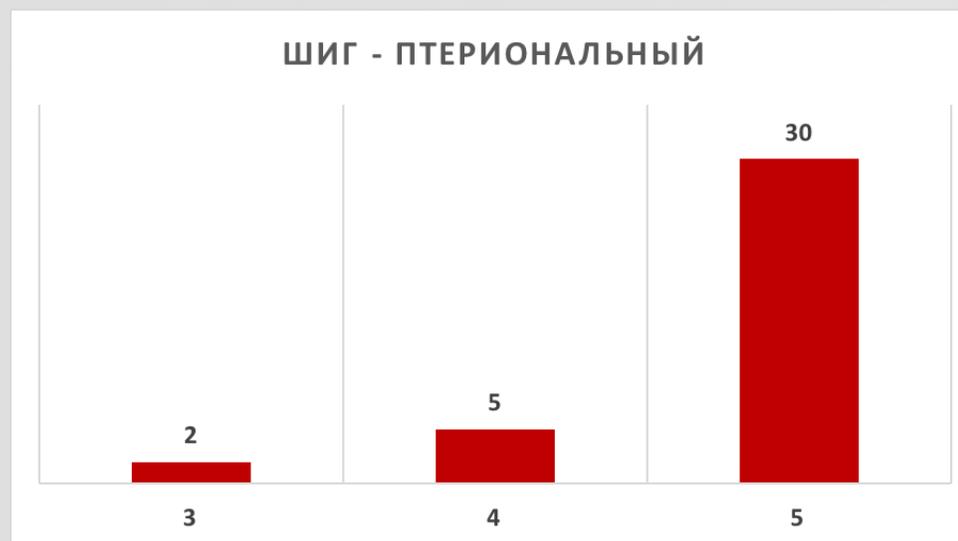
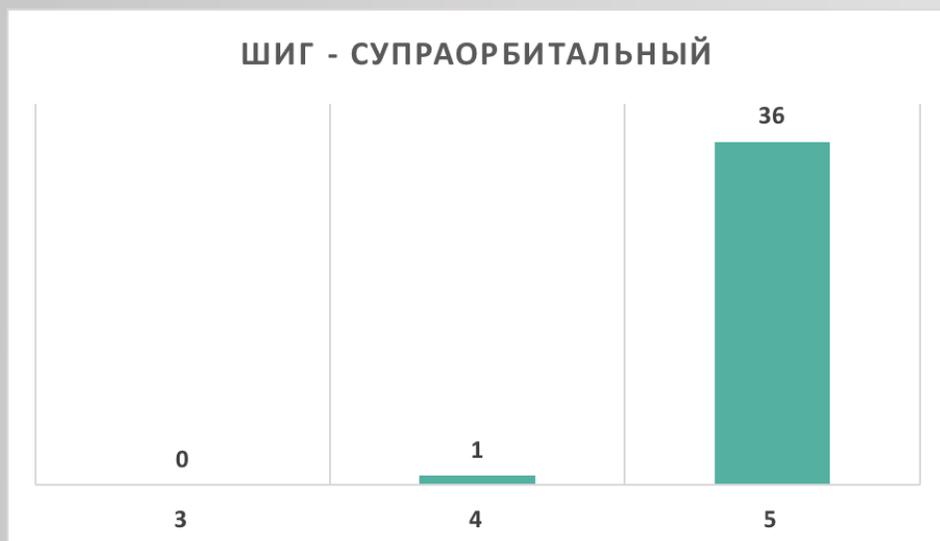
Операционная кровопотеря

Супраорбитальный n = 37	Птериональный n = 37	P - value
87,0 ± 30,7 мл	188,1 ± 59,4 мл	0,0000007
180 - 350 мл	350 - 500 мл	



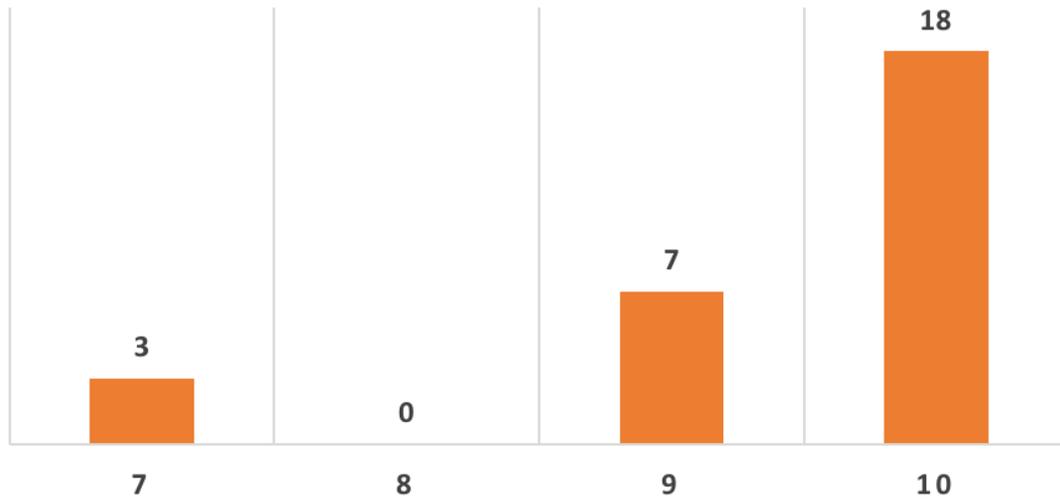
Исходы по шкале исходов Глазго

Исход по ШИГ, баллы	Супраорбитальный n=37		Птериональный n=37		P-value
	Неразорвавшаяся аневризма	Разорвавшаяся аневризма	Неразорвавшаяся аневризма	Разорвавшаяся аневризма	
3	0	0	0	2 (12,5%)	0,063
4	1 (4,8%)	0	2 (9,5%)	3 (18,8%)	
5	20 (95,2%)	16 (100%)	19 (90,5%)	11 (68,8%)	

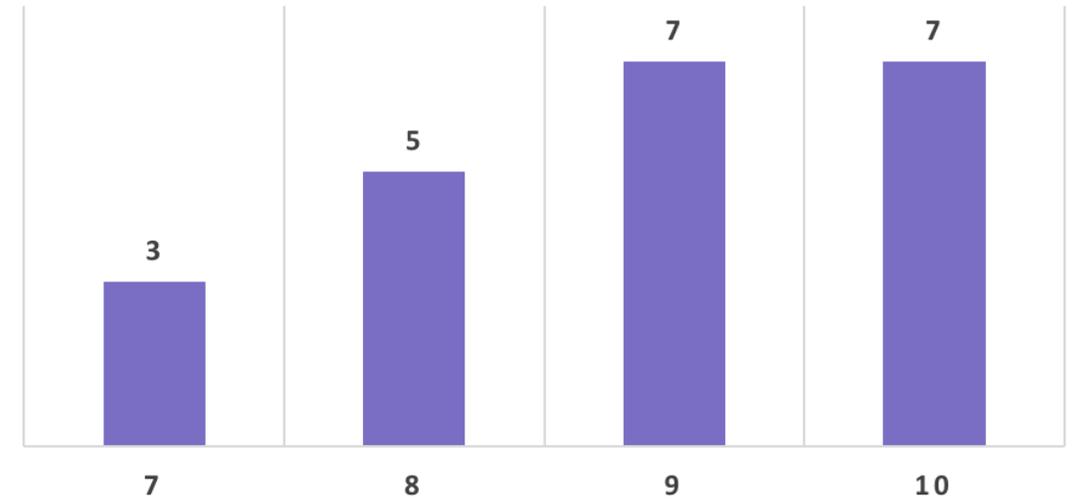


Удовлетворенность пациентов косметическим результатом операции

ВАШ - СУПРАОРБИТАЛЬНЫЙ



ВАШ - ПТЕРИОНАЛЬНЫЙ



$p = 0,01$

Данные катамнеза

	Супраорбитальный, n = 37	Птериональный, n = 37	P-value
Данные катамнеза доступны	28 (75,6%)	22 (59,5%)	0,09
Средний срок наблюдения	23,4 ± 12,3 месяц 3 – 38 месяцев	17,9 ± 18,7 месяца 6 – 31 месяц	

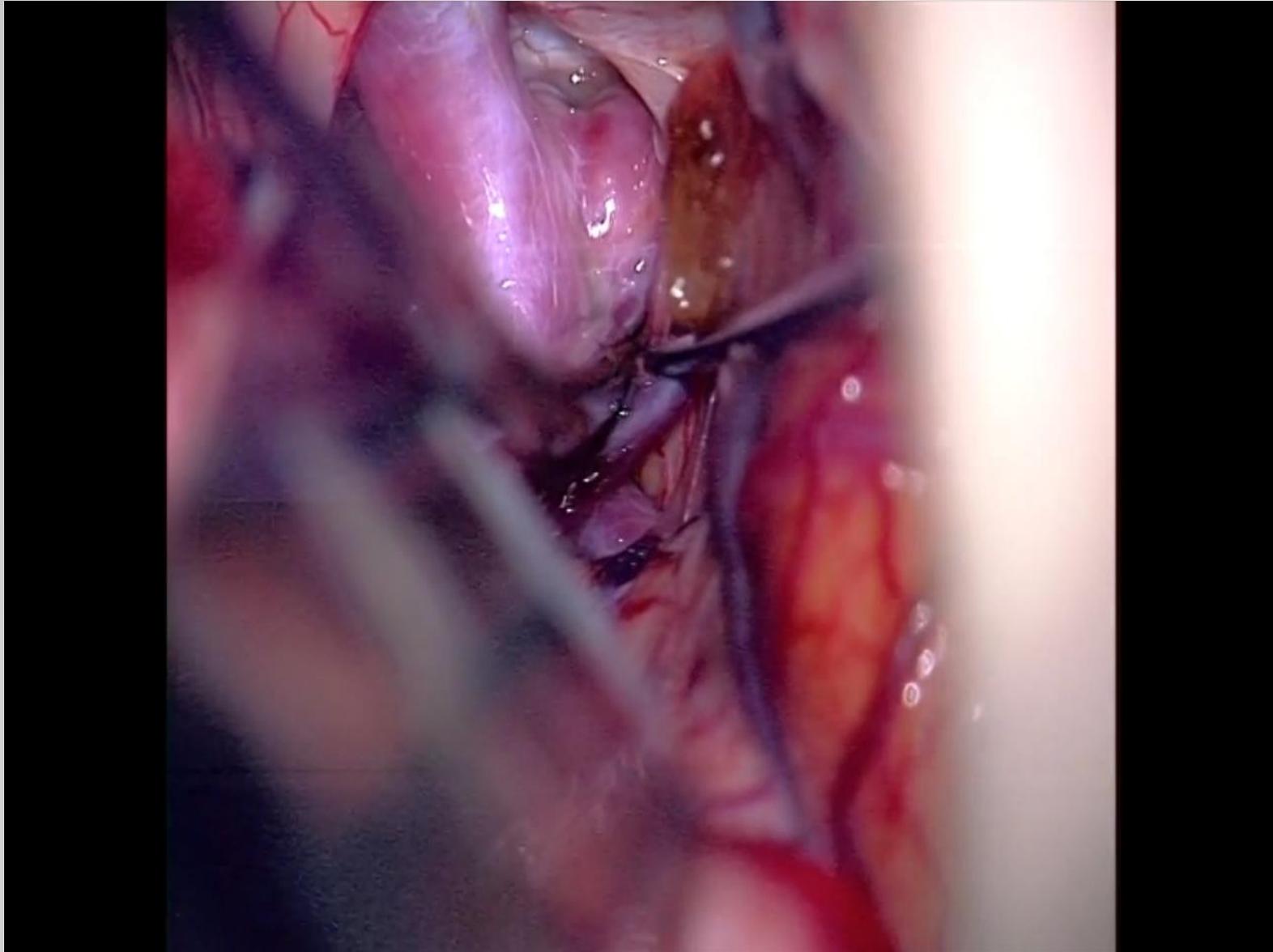
	Супраорбитальный n = 28	Птериональный n = 22	P-value
Онемение кожи в области доступа	5 (17,9)	3 (13,6)	0,715
Парез движений бровью	4 (14,3%)	0	0,12
Затруднены движения нижней челюстью	0	0	0,3
Боль при жевании	0	1 (4,6%)	0,44
Костный дефект/деформация в области доступа	12 (42,9%)	14 (63,6%)	0,166
Средний балл по ВАШ удовлетворенности пациентов косметическим результатом	9,4 ± 1 балл	8,8 ± 1 балл	p = 0,01





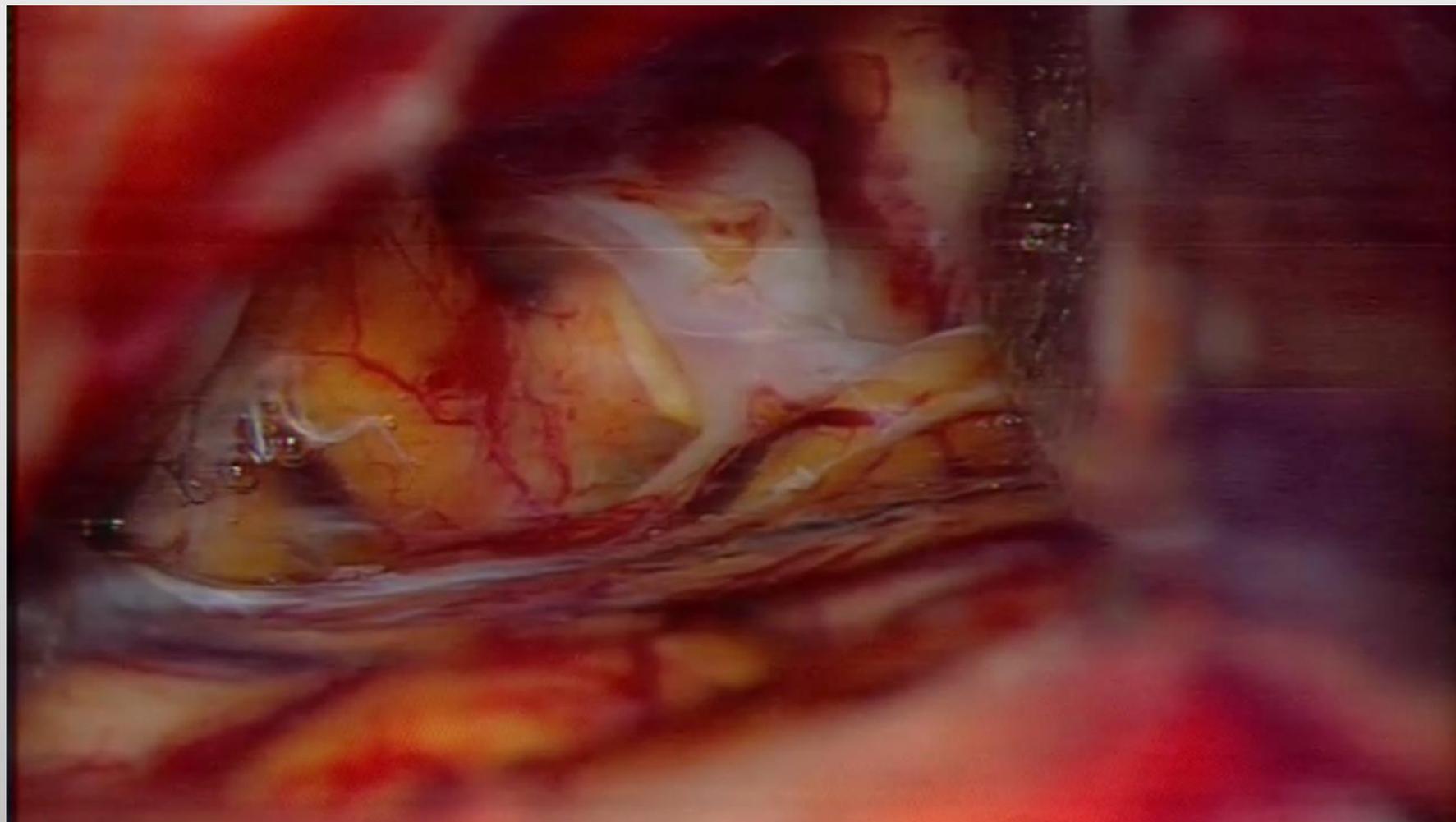


Клипирование аневризмы правой ВСА





Клипирование аневризмы ПМА-ПСА





Заключение

- В хирургии аневризмы супраорбитальный трансбровный доступ **не уступает по своим параметрам эффективности и безопасности** птериональному доступу
- Необходимо правильно определять показания для его использования
- Супраорбитальный трансбровный доступ во многих ситуациях может служить хорошей альтернативой птериональному доступу

Спасибо за внимание!

