

Aneurysma - ADPKD Guidelines und Management bei Schwangerschaft

Prof. Dr. med. Isabel Wanke

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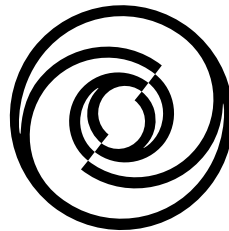
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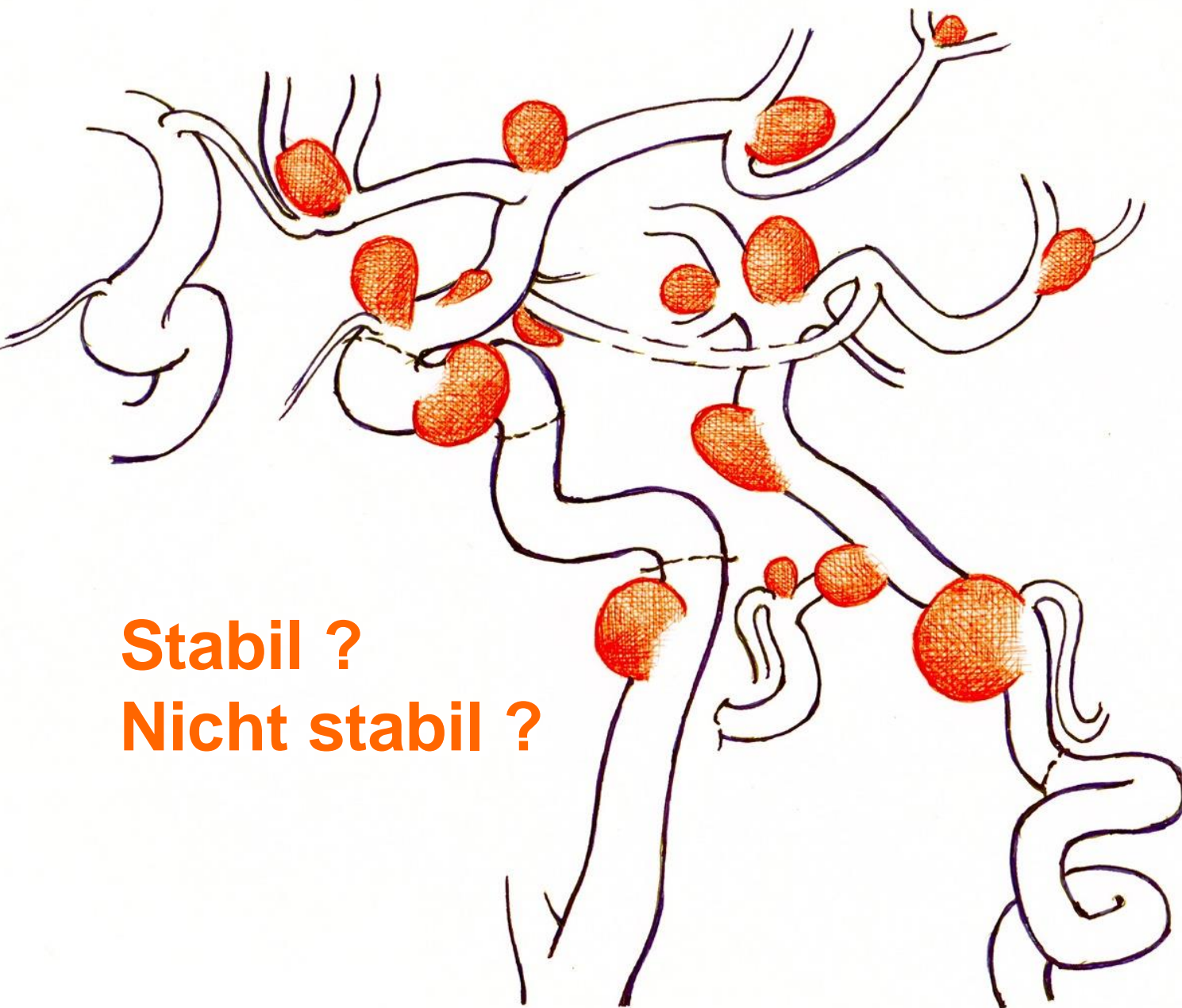
1-2% des Körpergewichts
15% der Herzleistung

MRI Befund bei Leuten ohne Symptome
Gefäßerkrankungen 10%
Aneurysmen 3%
Tumore <1%



Neurovaskuläre Erkrankungen:

- Cerebrovaskulärer Insult
- Aneurysma
- Vulnerables Hirn (60+)
 - postoperative cognitive disorders
- Gefässanomalien (AVM, ...)

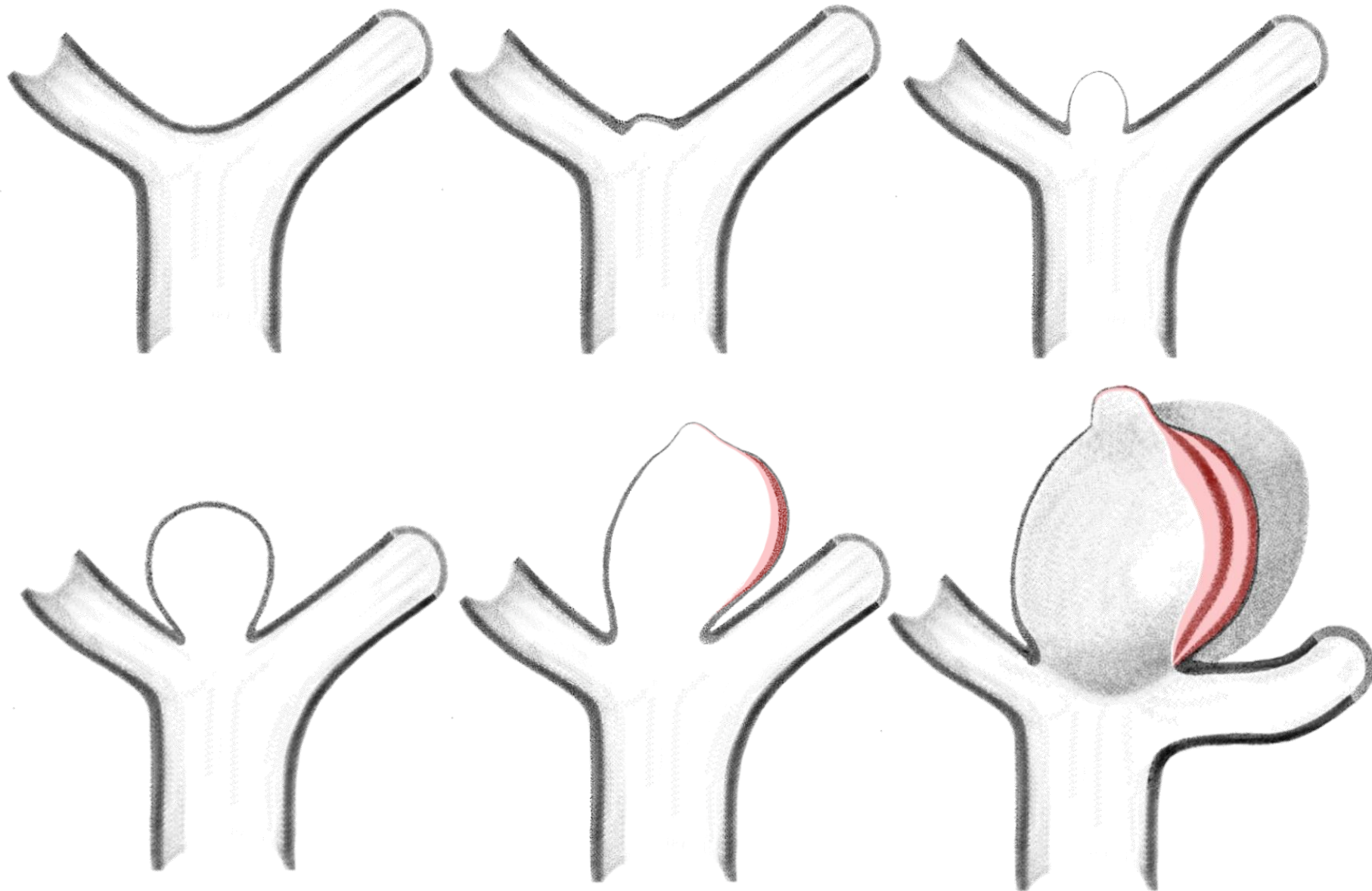


Stabil ?
Nicht stabil ?

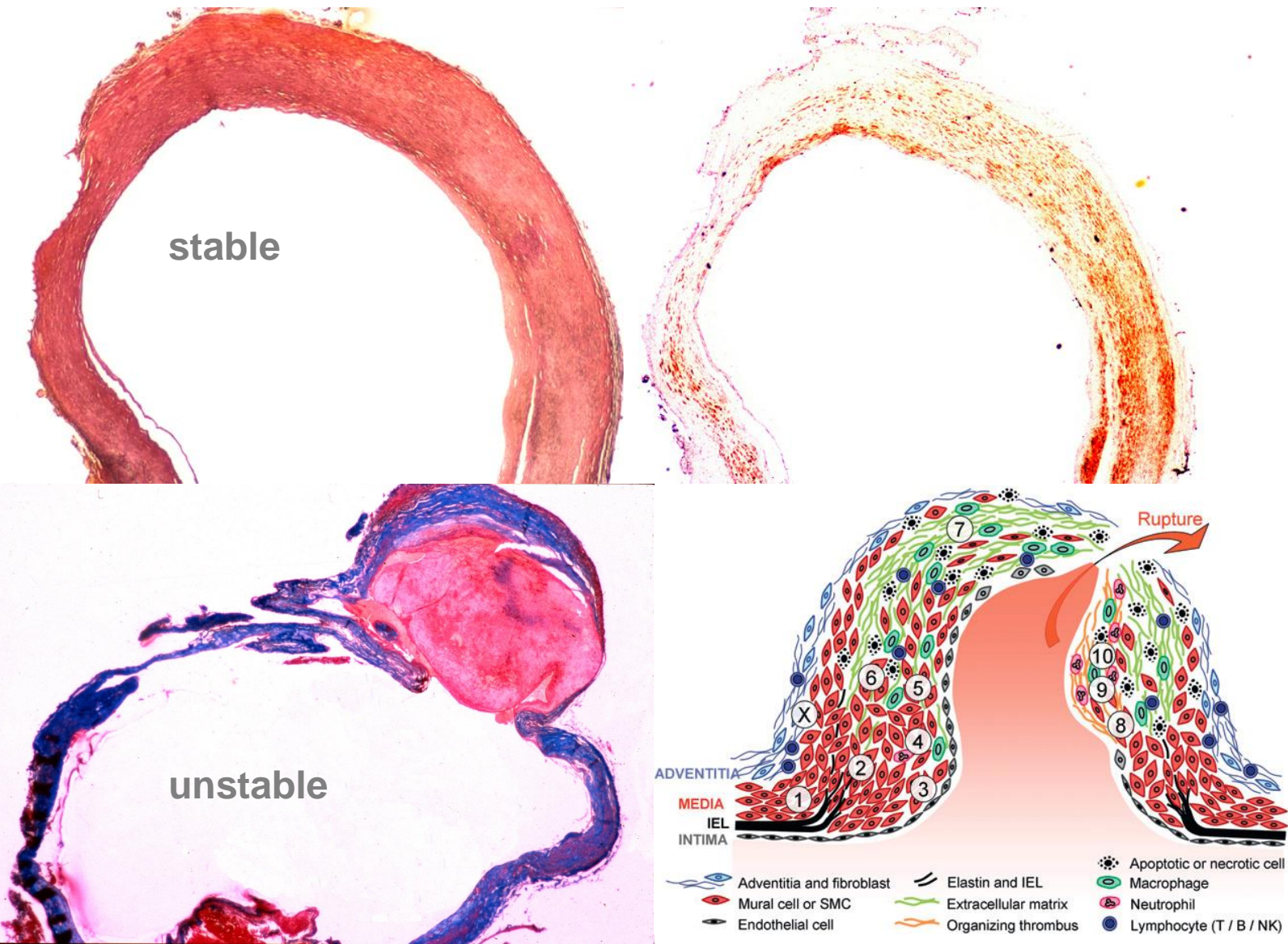
Zunehmend
Zufallsbefund Aneurysma
(Prävalenz ca. 3%:
3000 / 100'000 Leuten)

Ruptur – Inzidenz:
ca. 8 / Jahr von
3000 / 100'000 Leuten

- Grösse
- Lokalisation
- Form
- Entzündungszeichen
- Rauchen / Gingivitis
- Hypertension
- Familienanamnese
- **Spezielle Gefässerkrankungen**

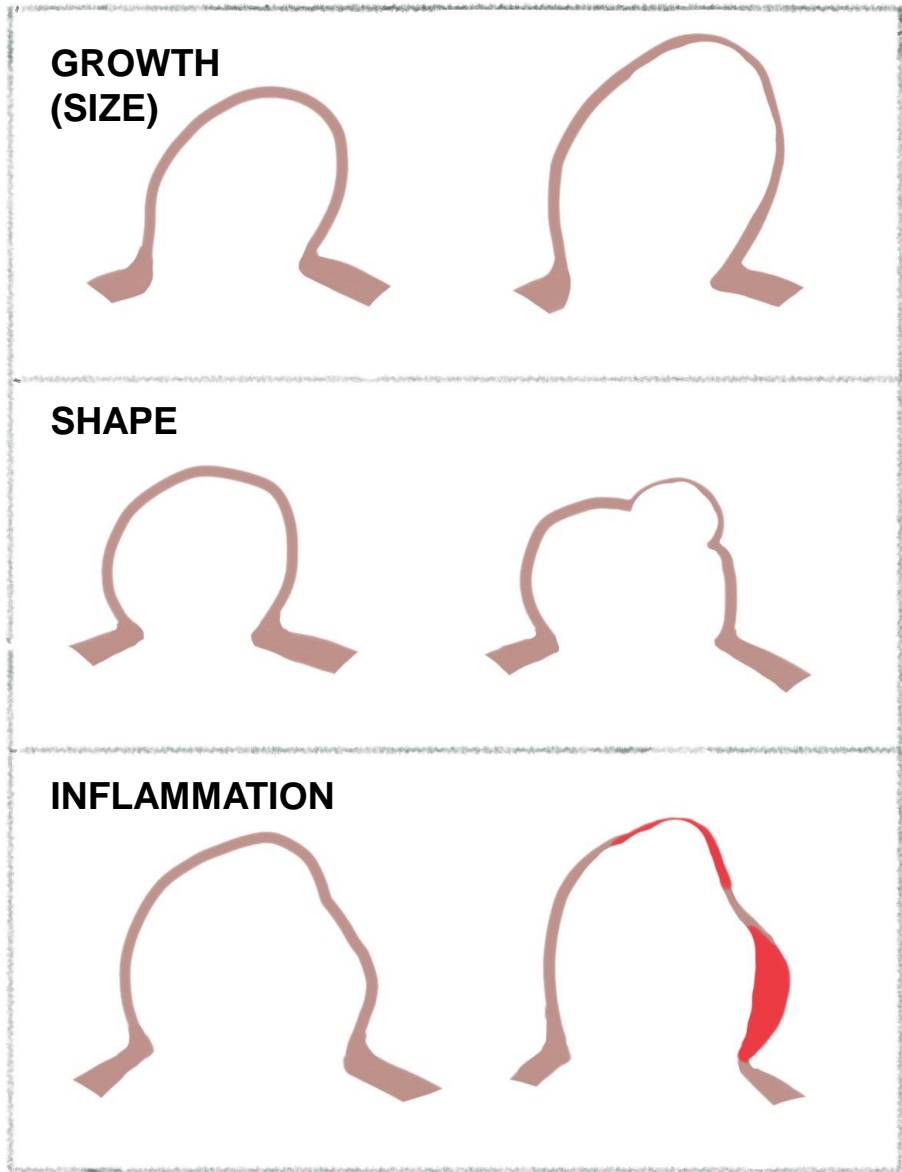


CDVC “Aneurysm” comprehensive care: Wall stability



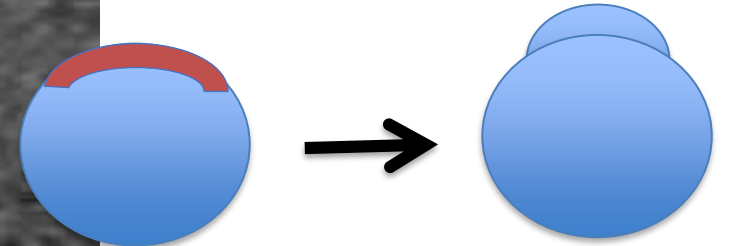
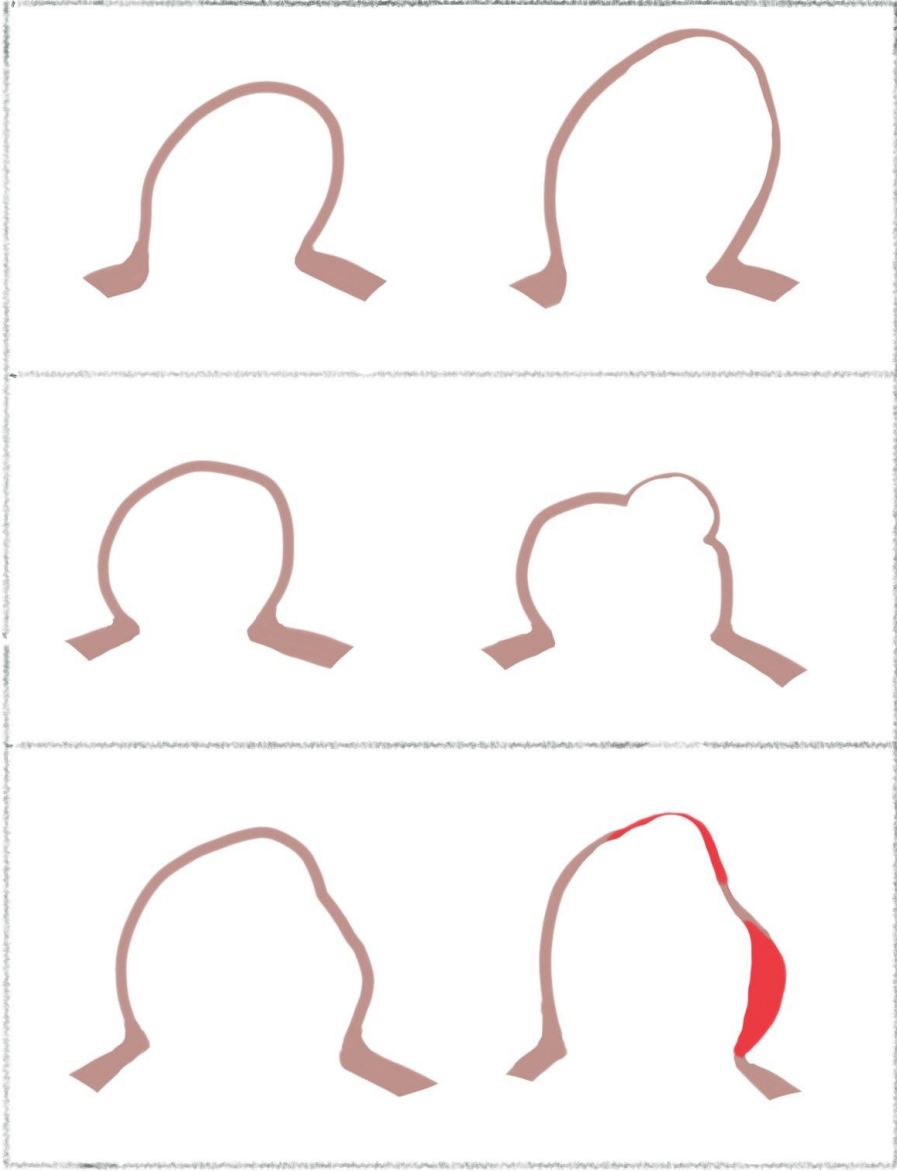
Tulamo et al.

MRI 3T **stable** **unstable**



Wanke et al.

Wie und wo wächst ein Aneurysma?



Aneurysma - ADPKD Guidelines und Management bei Schwangerschaft

- Bekannter Zufallsbefund
 - stabil vs. Instabil (MR/MRA)
- Option Therapie vor Schwangerschaft
- Option Kontrolle im 2. Trimester
- Option Kontrolle im 3. Trimester
- Therapie bei SAB/Instabilität
 - Neurochirurgisch / Endovaskulär
- **Blutdruckmanagement**

Zunehmend

Zufallsbefund Aneurysma

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Stroke, 2023 vol. 54(1) pp. 198-207

Subarachnoid Hemorrhage During Pregnancy and Puerperium: A Population-Based Study.

Korhonen, A et al.

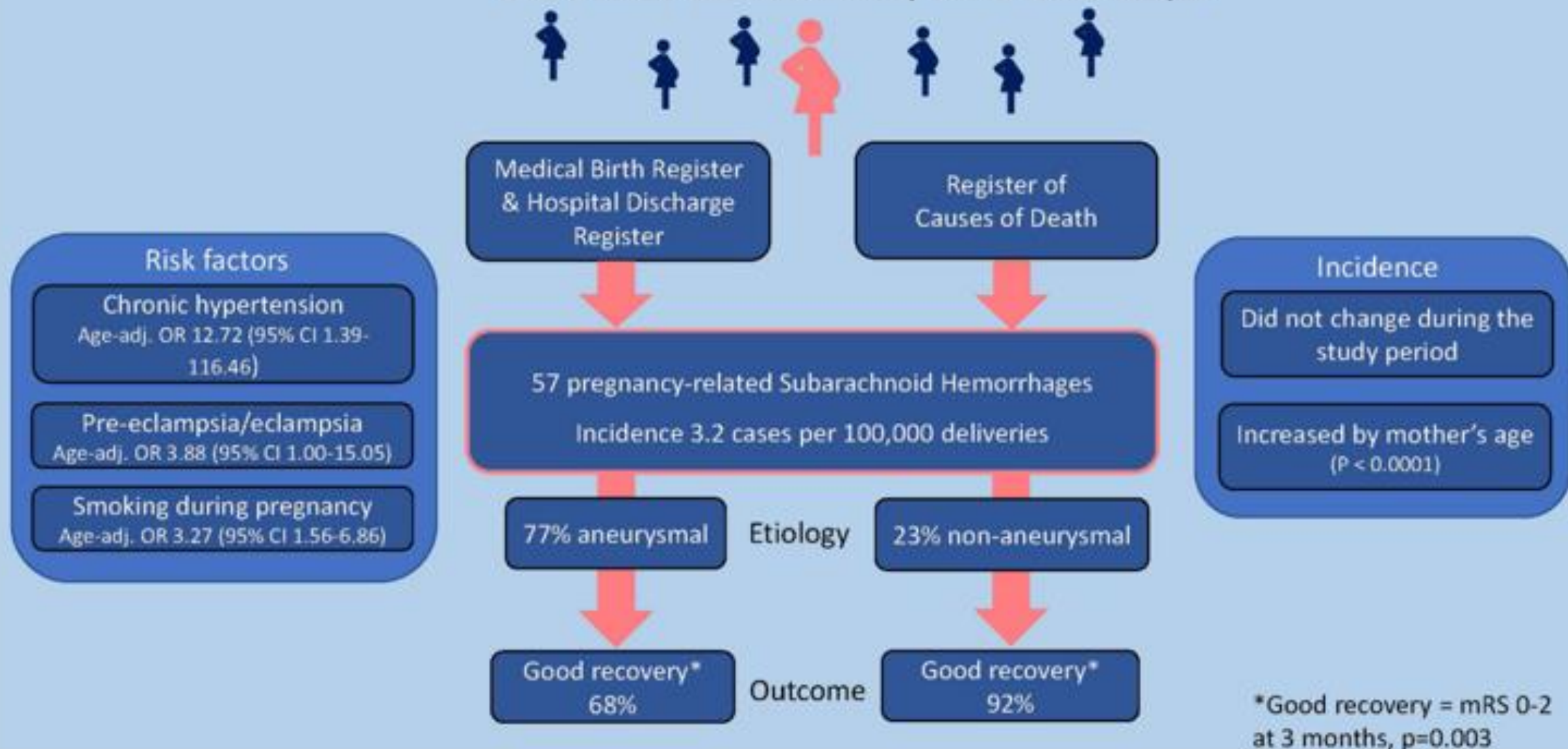
METHODS: We performed a retrospective population-based cohort study and nested case-control study in Finland for the period 1987-2016 (Stroke in Pregnancy and Puerperium in Finland). The Medical Birth Register was linked to the Hospital Discharge Register to identify women with incident stroke during pregnancy or puerperium. A subcohort of women with SAH is included in this analysis. The temporal connection of SAH to pregnancy and clinical details were verified from patient records.

RESULTS: The unadjusted incidence of pSAH was 3.21 (95% CI, 2.46-4.13) per 100 000 deliveries. No significant increase occurred in the incidence throughout the study period. However, the age of the mother had a significant increasing effect on the incidence. In total, 77% of patients suffered an aneurysmal pSAH, resulting in death in 16.3% of women and with only 68.2% achieving good recovery (modified Rankin Scale score 0-2) at 3 months. Patients with nonaneurysmal pSAH recovered well. The significant risk factors for pSAH were smoking (odds ratio, 3.27 [1.56-6.86]), prepregnancy hypertension (odds ratio, 12.72 [1.39-116.46]), and pre-eclampsia/eclampsia (odds ratio, 3.88 [1.00-15.05]).

CONCLUSIONS: The incidence of pSAH has not changed substantially over time in Finland. The majority of pSAH cases were aneurysmal and women with aneurysm had considerable mortality and morbidity. Counseling of pregnant women about smoking cessation and monitoring of blood pressure and symptoms of pre-eclampsia are important interventions to prevent pSAH.

Subarachnoid Hemorrhage during Pregnancy and Puerperium

A population-based cohort study (n=1,773,728 deliveries) in Finland for the period 1987-2016
with a nested case-control study for risk factor analysis



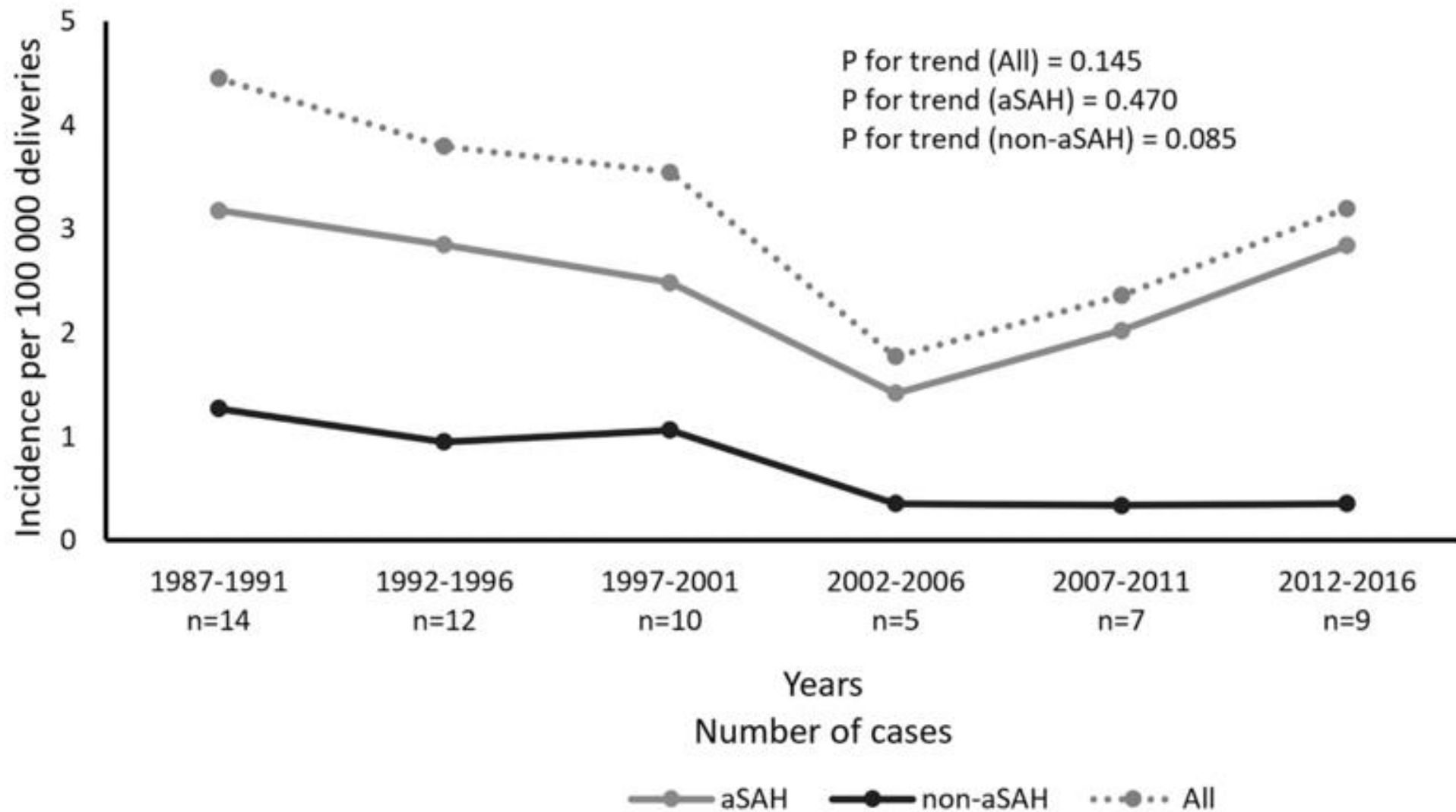


Figure 1. Incidence of pregnancy-related subarachnoid hemorrhage (SAH) by 5-y periods in 1987–2016. aSAH indicates aneurysmal subarachnoid hemorrhage; and non-aSAH, non-aneurysmal subarachnoid hemorrhage.

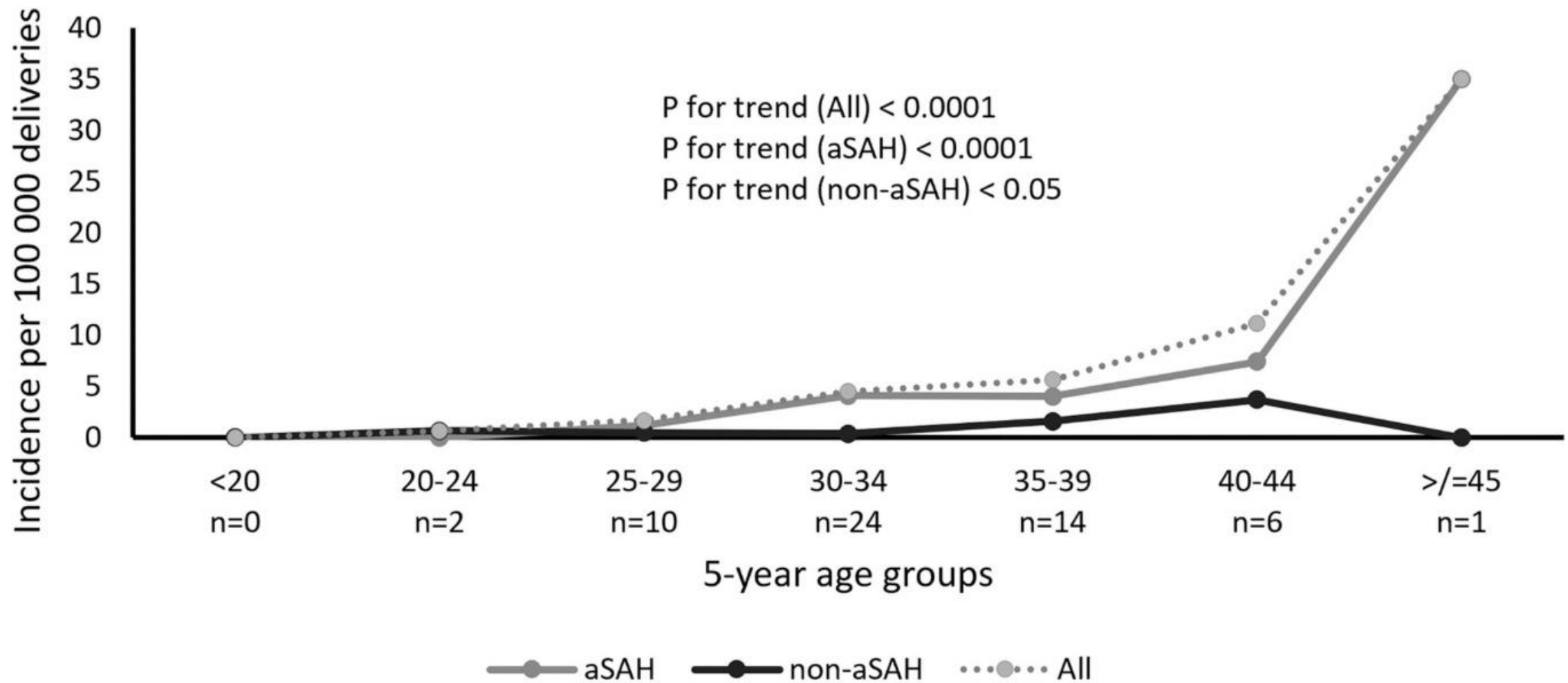


Figure 2. Incidence of pregnancy-related subarachnoid hemorrhage (SAH) per 100 000 deliveries for 5-y age groups. aSAH indicates aneurysmal subarachnoid hemorrhage; and non-aSAH, non-aneurysmal subarachnoid hemorrhage.

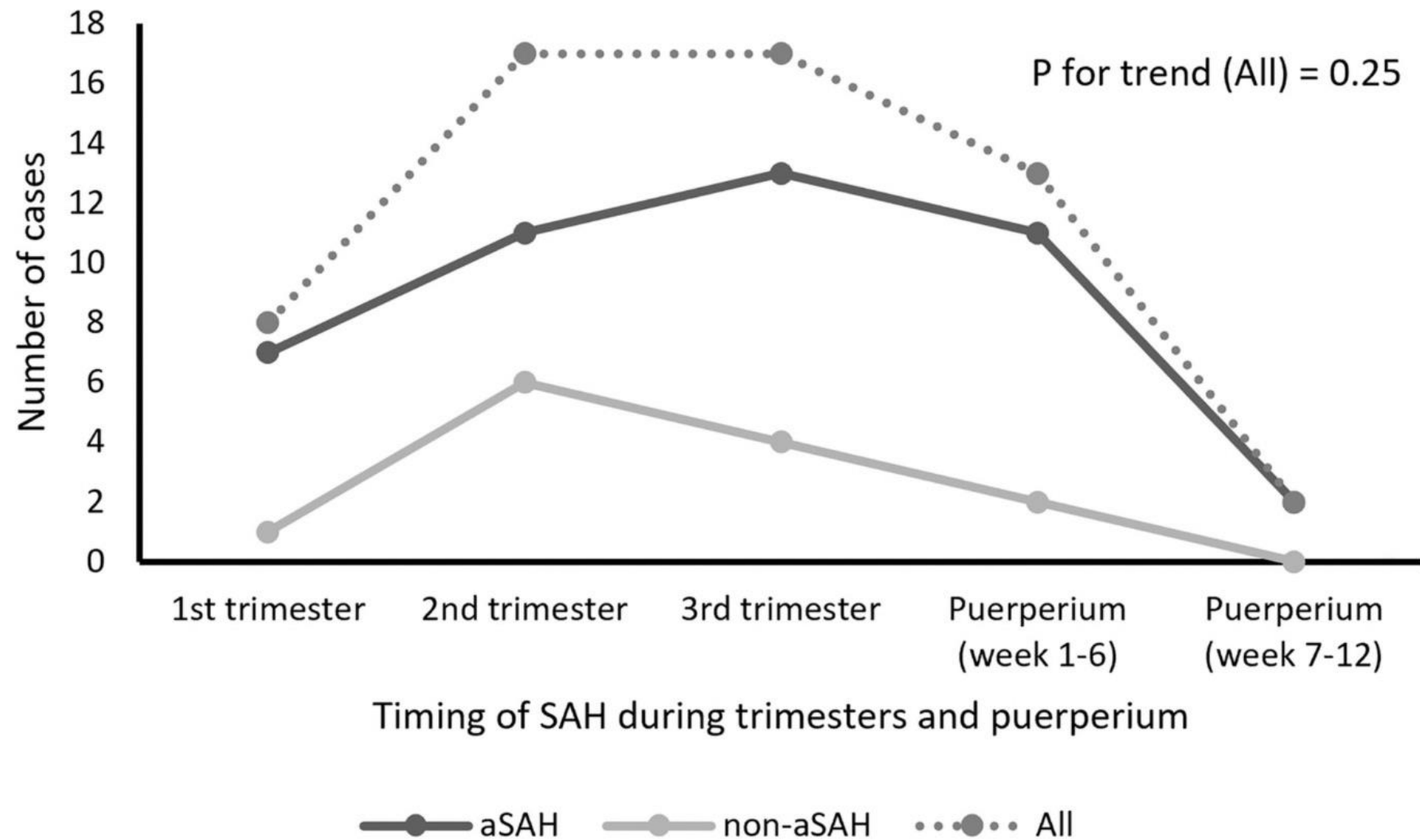


Figure 3. Timing of subarachnoid hemorrhage (SAH) during trimesters and puerperium. aSAH indicates aneurysmal subarachnoid hemorrhage; and non-aSAH, non-aneurysmal subarachnoid hemorrhage.

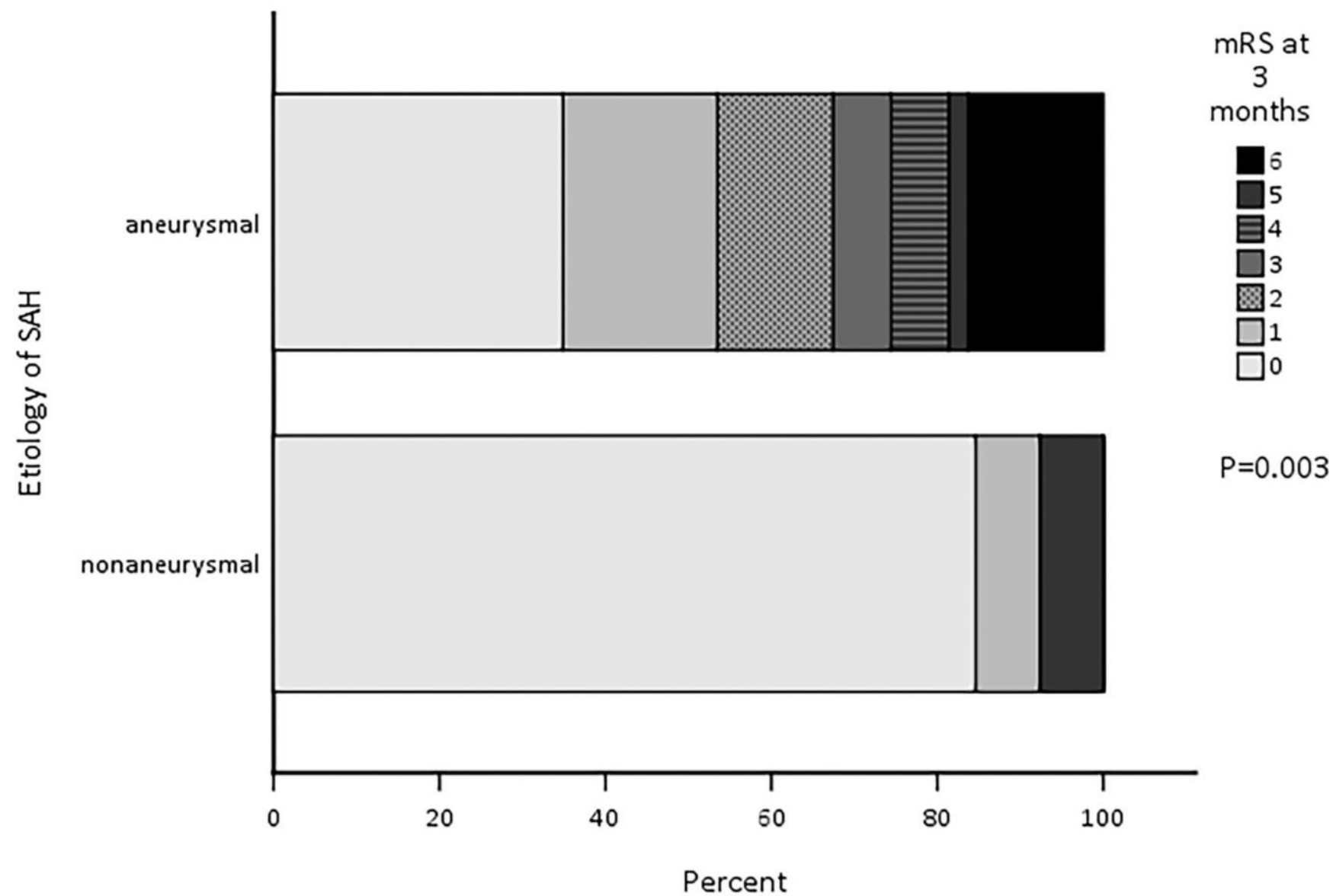


Figure 4. Modified Rankin Scale for aneurysmal and nonaneurysmal subarachnoid hemorrhage (SAH) at 3 mo from the onset of SAH.

Aneurysmal subarachnoid hemorrhage in pregnancy: National trends of treatment, predictors, and outcomes

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Data Availability Statement: The data underlying the results presented in the study are available from National Inpatient Sample (NIS) database. All data is available for download directly from NIS.

Abstract

Introduction

Aneurysmal subarachnoid hemorrhage (aSAH) is a rare event associated with significant pregnancy-associated maternal and neonatal morbidity and mortality. The optimal treatment strategy and clinical outcome of aSAH in pregnancy remains unclear. We aimed to investigate the treatment utilizations and outcomes of aSAH in pregnant people.

Methods

Using the 2010–2018 National Inpatient Sample, we identified all birth hospitalizations of women between ages of 18 to 45 associated with subarachnoid hemorrhage and aneurysm treatment were included. Multivariate analyses were used to evaluate the effect of pregnancy state, mode of treatment of aneurysms, severity of subarachnoid hemorrhage on mortality and discharge destination of this cohort. Trends in mode of treatment utilized for aneurysmal treatment in this time interval was evaluated.

Results

13,351 aSAH with treatment were identified, of which 440 were associated with pregnancy. There was no significant difference in mortality or rate of discharge to home in pregnancy related hospitalization. Worse aSAH severity, chronic hypertension, and smaller hospital size was associated with significantly higher rate of mortality from aSAH during pregnancy. Worse aSAH severity was associated with lower rate of discharge to home. Like the non-pregnant cohort, the treatment of ruptured aneurysms in pregnancy are increasingly through

METHODS: Using the **2010-2018 National Inpatient Sample**, we identified all birth hospitalizations of **women between ages of 18 to 45 associated with subarachnoid hemorrhage and aneurysm treatment** were included. Multivariate analyses were used to evaluate the effect of pregnancy state, mode of treatment of aneurysms, severity of subarachnoid hemorrhage on mortality and discharge destination of this cohort. Trends in mode of treatment utilized for aneurysmal treatment in this time interval was evaluated. **RESULTS: 13,351 aSAH with treatment were identified, of which 440 were associated with pregnancy.** There was no significant difference in mortality or rate of discharge to home in pregnancy related hospitalization. Worse aSAH severity, chronic hypertension, and smaller hospital size was associated with significantly higher rate of mortality from aSAH during pregnancy. Worse aSAH severity was associated with lower rate of discharge to home. Like the non-pregnant cohort, the treatment of ruptured aneurysms in pregnancy are increasingly through endovascular approaches. The mode of treatment does not change the mortality or discharge destination. **CONCLUSIONS: Pregnancy does not alter mortality or the discharge destination for aSAH.** Ruptured aneurysms during pregnancy are increasingly treated endovascularly. Mode of aneurysm treatment does not affect mortality or discharge destination in pregnancy.

Table 1. Baseline characteristics of patients hospitalized with aneurysmal subarachnoid hemorrhage with pregnancy and without pregnancy.

Variable	Non-pregnant persons	Pregnant persons	p-value
	(n = 12,911)	(n = 440)	
Age; median (Q1-Q3)	38.8 (33.0–42.3)	32.3 (27.7–38.0)	< .01
NIS-SSS; median (Q1-Q3)	0.9 (0–2.0)	0.8 (0–1.8)	0.4640
Hypertensive Disease of Pregnancy		71 (16.2%)	
Chronic Hypertension	6886 (53.3%)	184 (41.8%)	0.04
Diabetes Mellitus	780 (6.0)	20 (4.4%)	0.53
Smoking	4824 (37.4%)	132(30.0%)	0.17
Treatment			0.42
Coil	9048 (70.1%)	326 (74.0%)	
Clip	3863 (29%)	115 (26.0%)	

Trend of intervention utilization in ruptured aneurysms

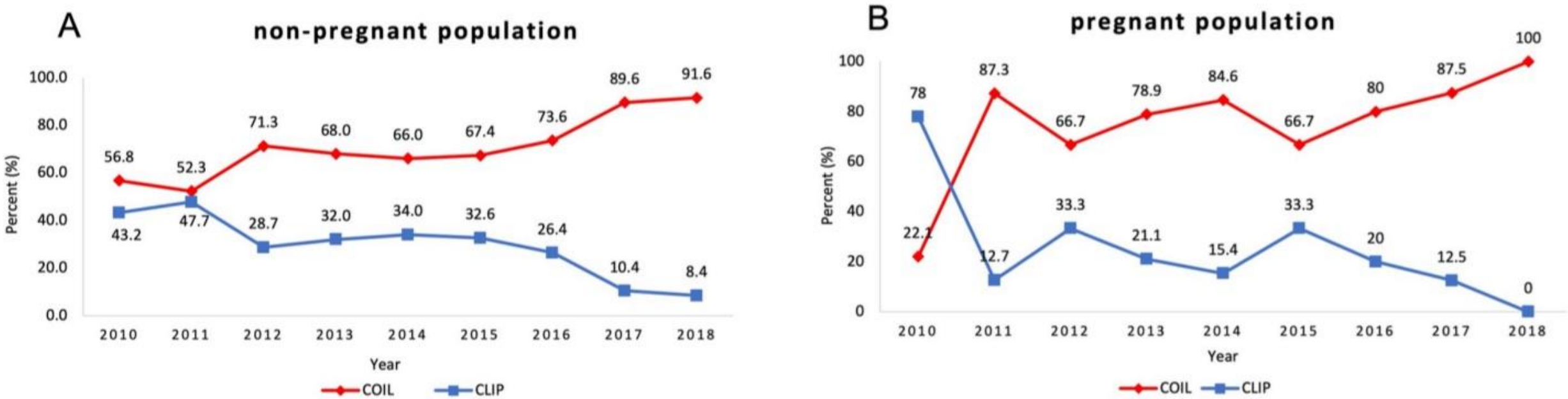


Fig 3. Shows trends of mode of aneurysm treatment after subarachnoid hemorrhage in the hospitalizations associated A. without and B. with pregnancy.

<https://doi.org/10.1371/journal.pone.0285082.g003>

Original research

Endovascular coiling versus neurosurgical clipping for treatment of ruptured and unruptured intracranial aneurysms during pregnancy and postpartum period

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► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/neurintsurg-2022-018705>).

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ABSTRACT

Background Selection of appropriate surgical strategy for the treatment of intracranial aneurysms (IA) during pregnancy requires careful consideration of the potential risks to the mother and fetus. However, limited data guide treatment decisions in these patients. We compared the safety profiles of endovascular coiling (EC) and neurosurgical clipping (NC) performed for the treatment of ruptured and unruptured IA during pregnancy and the postpartum period.

Methods Pregnancy-related or postpartum hospitalizations undergoing surgical intervention for IA were identified from the Nationwide Readmissions Database 2016–2018. Safety outcomes included periprocedural complications, in-hospital mortality, discharge disposition, and 30-day non-elective readmissions.

Results There were 348 pregnancy-related or postpartum hospitalizations that met the study inclusion criteria (mean±SD age 31.8±5.9 years). Among 168 patients treated for ruptured aneurysms, 115 (68.5%) underwent EC and 53 (31.5%) underwent NC; whereas among 180 patients treated for unruptured aneurysms, 140 (77.8%) underwent EC and 40 (22.2%) underwent NC. There were no statistically significant differences in the baseline characteristics between patients undergoing EC versus NC for either ruptured or unruptured aneurysm groups. The outcomes were statistically comparable between EC and NC for both ruptured and unruptured IA, except for a lower incidence of ischemic stroke in patients undergoing EC for ruptured aneurysms (OR 0.12, 95% CI 0.02 to 0.84).

Conclusions Most pregnant and postpartum patients are treated with EC for both ruptured and unruptured IA. For treatment of ruptured IA, EC is independently associated with a lower risk of perioperative ischemic stroke, but other in-hospital complications and mortality are comparable between EC and NC.

INTRODUCTION

Rupture of intracranial aneurysms (IA) during pregnancy carries significant morbidity and mortality for both mother and fetus. The incidence of non-traumatic subarachnoid hemorrhage (SAH) is estimated to range from 3 to 10 per 100 000 pregnancies.¹ The hemodynamic and hormonal changes during pregnancy favor the formation, growth, and potential rupture of the IA,² especially during the third trimester.³ The two most common methods for treatment of IA are endovascular coiling (EC) and neurosurgical clipping (NC). Both techniques have comparable efficacy, safety profiles, and 1-year morbidity and mortality rates.⁴ However, patients treated with EC may have shorter

Key messages

What is already known on this topic

⇒ Endovascular coiling (EC) or neurosurgical clipping (NC) can be used for the treatment of IA; however, selection between these two surgical strategies in the unique setting of pregnancy requires careful consideration of the potential risks to the mother and fetus. There are limited data that guide the treatment decisions in these patients.

What this study adds

⇒ We found that most pregnant and postpartum patients are treated with EC for both ruptured and unruptured IA. We also observed that EC is associated with a lower rate of ischemic stroke in patients with ruptured IA.

How this study might affect research, practice, or policy

⇒ Given the lower rate of ischemic stroke with the use of EC, a staged procedure with emergent endovascular treatment to secure the ruptured aneurysm during pregnancy followed by a more definitive treatment with either EC or NC after delivery should be considered in the appropriate clinical scenario and explored in the future studies.

length of hospital stay and a lower rate of postoperative new neurological deficits.^{4–5} Management of IA during pregnancy is especially challenging due to the potential fetal risks associated with the exposure to anesthesia, contrast, and radiation; limits on maternal hyperventilation to lower intracranial pressure in the case of ruptured IA; and the obstetric bleeding risks associated with altered maternal coagulation cascade and the potential use of systemic anticoagulation during EC.³ To date, there have been no evidence-based guidelines to assist physicians with the choice of EC or NC when treating IA during pregnancy. In this study, we compare the safety profiles of EC and NC in the treatment of unruptured and ruptured IA during pregnancy and postpartum period.

METHODS

Data source

Data in this study were obtained from the Nationwide Readmissions Database (NRD) 2016–2018, developed by the Agency for Healthcare Research

METHODS: Pregnancy-related or postpartum hospitalizations undergoing surgical intervention for IA were identified from the **Nationwide Readmissions Database 2016–2018**. Safety outcomes included periprocedural complications, in-hospital mortality, discharge disposition, and 30-day non-elective readmissions. **RESULTS:** There were 348 pregnancy-related or postpartum hospitalizations that met the study inclusion criteria (mean±SD age 31.8±5.9 years). Among 168 patients treated for ruptured aneurysms, 115 (68.5%) underwent EC and 53 (31.5%) underwent NC; whereas among 180 patients treated for unruptured aneurysms, 140 (77.8%) underwent EC and 40 (22.2%) underwent NC. There were no statistically significant differences in the baseline characteristics between patients undergoing EC versus NC for either ruptured or unruptured aneurysm groups. The outcomes were statistically comparable between EC and NC for both ruptured and unruptured IA, except for a lower incidence of ischemic stroke in patients undergoing EC for ruptured aneurysms (OR 0.12, 95% CI 0.02 to 0.84). **CONCLUSIONS:** Most pregnant and postpartum patients are treated with EC for both ruptured and unruptured IA. For treatment of ruptured IA, EC is independently associated with a lower risk of perioperative ischemic stroke, but other in-hospital complications and mortality are comparable between EC and NC.

Trend Toward Vaginal Versus Cesarean Deliveries in Pregnant Patients with Unruptured Intracranial Aneurysms in the 2010s: A Nationwide Inpatient Analysis

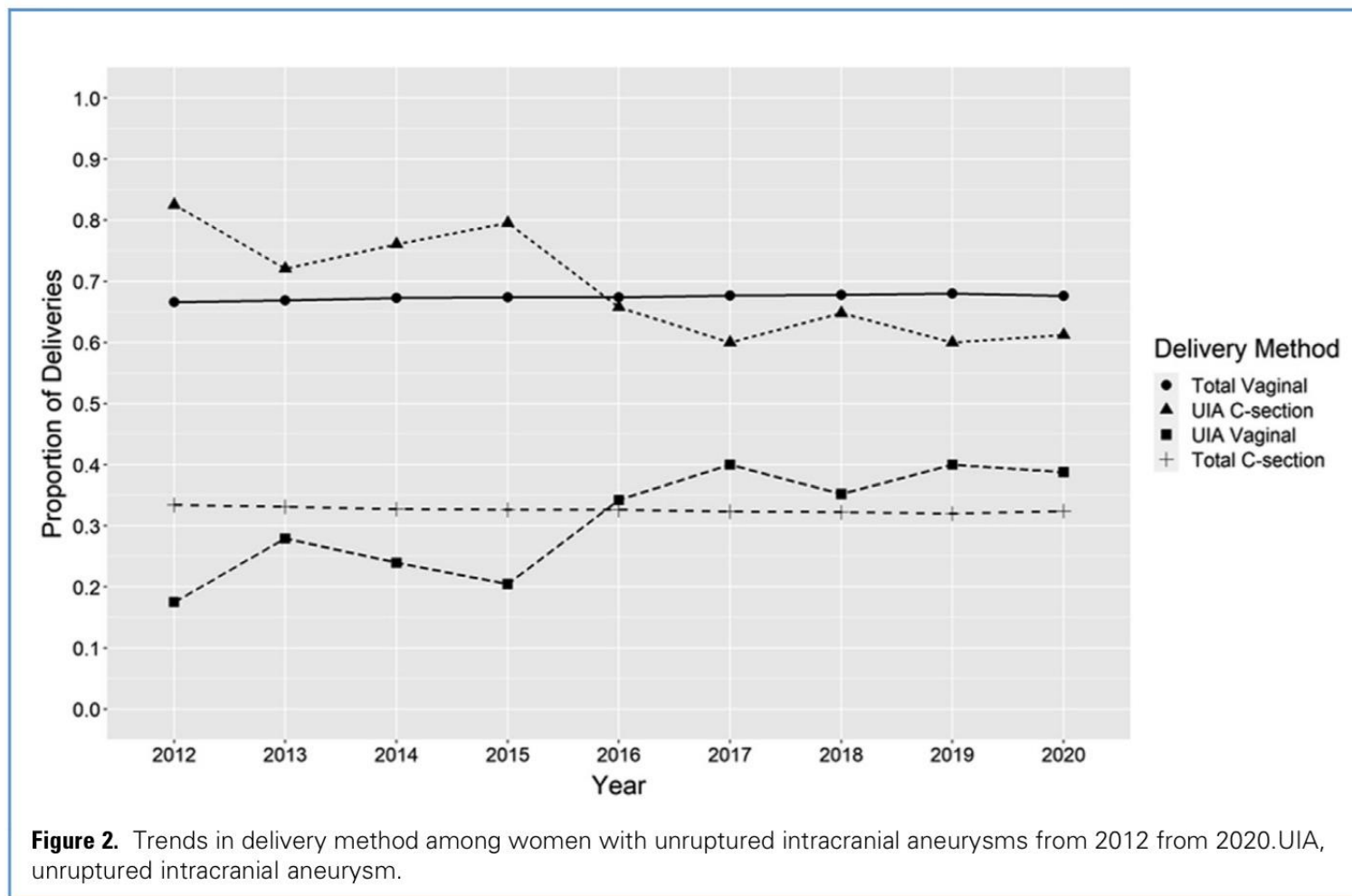
Richard Chiu¹, Ryan G. Chiu², Faraaz Azam², Srivats Srinivasan², Amy Zheng³, Jonathan A. White²

■ **OBJECTIVE:** The safety of spontaneous vaginal delivery in pregnant patients with known unruptured intracranial aneurysms (UIAs) has been supported by increasing evidence over the past 2 decades. However, the extent to which this increased evidence has since influenced changes, if any, in actual clinical practice, has yet to be studied.

■ **METHODS:** Using the 2012 to 2020 Nationwide Inpatient Sample, trends in vaginal versus caesarian delivery among mothers with UIAs were assessed in temporal fashion and compared to overall trends in delivery modality during the same period. Demographic, hospital, and insurance characteristics were also assessed for relationship with method of delivery.

■ **RESULTS:** A total of 6,624,556 obstetrical patients presented for elective delivery in the 2012–2020 Nationwide Inpatient Sample. This included 419 patients with UIA included in the final analysis. Patients in later years were over twice as likely to have been given a trial of vaginal delivery (odds ratio: 2.01, 95% confidence interval: 1.29 to 3.14, $P = 0.002$). This was also statistically significantly different from overall rates of vaginal versus caesarian delivery in the overall cohort ($P < 0.001$). Hospital, regional, demographic and payer characteristics analyzed were not significantly associated with delivery method.

■ **CONCLUSIONS:** There was a significant trend over the 2010s toward permitting more spontaneous vaginal deliveries for obstetrical patients with known UIAs.





Review

Pharmaceutical Modulation of Intracranial Aneurysm Development and Rupture

Alex Crane ¹ , Regan M. Shanahan ¹ , Joseph S. Hudson ¹, Kamil W. Nowicki ², Zachary C. Gersey ¹ , Prateek Agarwal ¹, Rachel C. Jacobs ¹, Michael J. Lang ¹ and Bradley Gross ^{1,*}

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Abstract: Management of intracranial aneurysms (IAs) is determined by patient age, risk of rupture, and comorbid conditions. While endovascular and microsurgical interventions offer solutions to mitigate the risk of rupture, pharmacological management strategies may complement these approaches or serve as alternatives in appropriate cases. The pathophysiology of IAs allows for the targeting of inflammation to prevent the development and rupture of IAs. The aim of this review is to provide an updated summary of different pharmaceutical management strategies for IAs. Acetylsalicylic acid and renin-angiotensin-aldosterone system (RAAS) inhibitor antihypertensives have some evidence supporting their protective effect. Studies of selective cyclooxygenase-2 (COX-2) inhibitors, statins, ADP inhibitors, and other metabolism-affecting drugs have demonstrated inconclusive findings regarding their association with aneurysm growth or rupture. In this manuscript, we highlight the evidence supporting each drug's effectiveness.

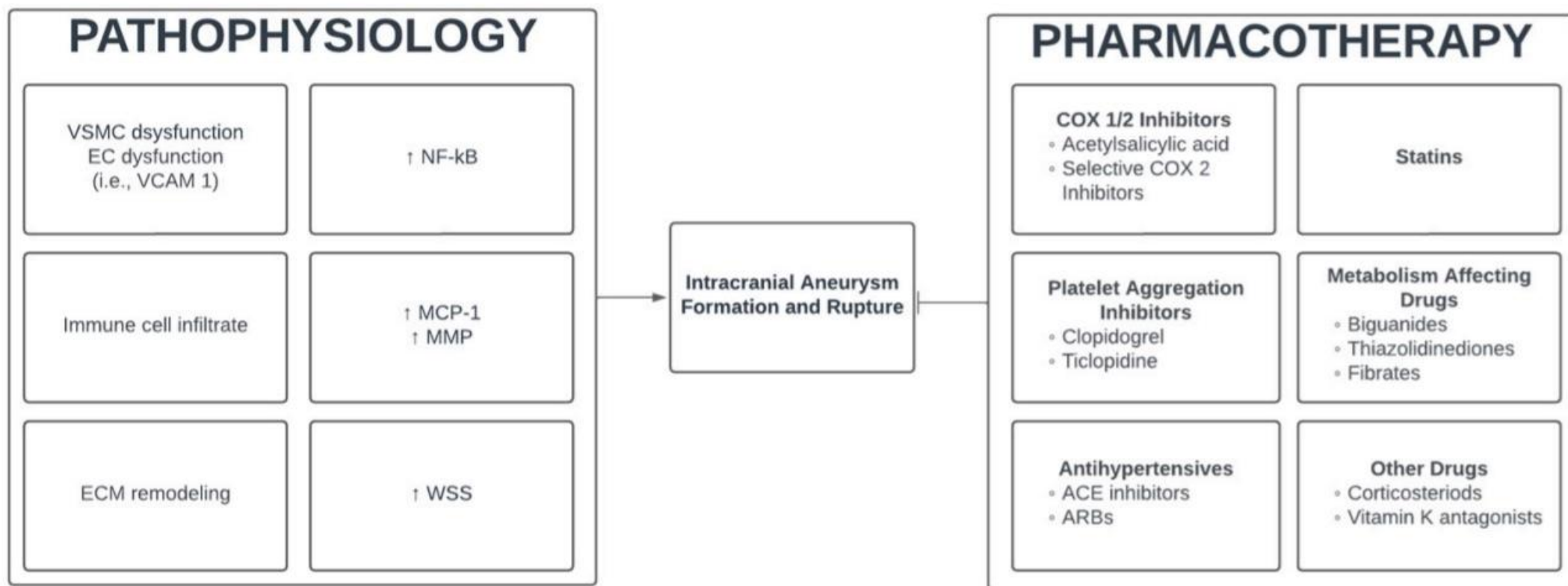


Figure 1. Summary of pathophysiology and pharmacotherapy that could modulate IA formation and rupture.

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- Bekannter Zufallsbefund
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