



KAROTİS ENDARTEREKTOMİDE BÖLGESEL BLOK UYGULAMALARI

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Anesteziyoloji ve Reanimasyon Kliniği, 2010

İNME

- Karotis arter stenozu
 - Kraniyal iskemik enfarktüs oluşumu
 - İnme gelişimine neden olabilen
 - Tıkayıcı arter hastalığıdır.
- İnme 3. sıklıkta ölüm nedeni



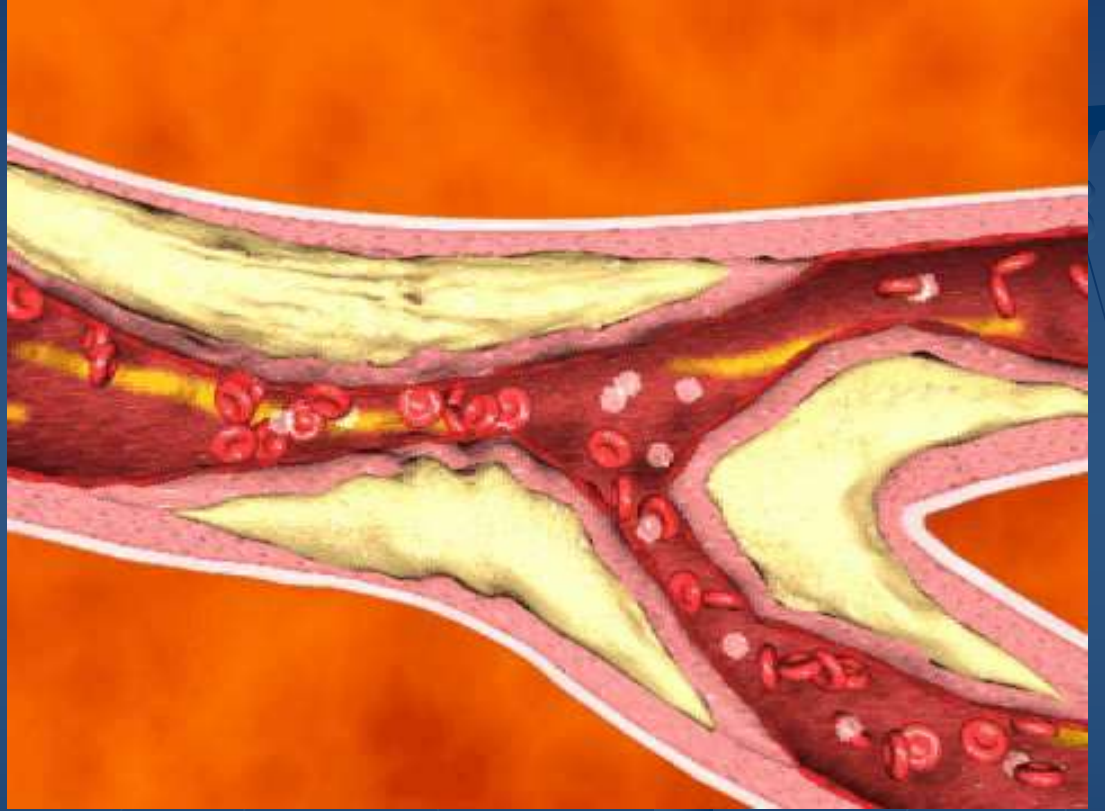
Endotel hasarı



Trombosit adezyonu
/ agregasyonu



Lökosit göçü

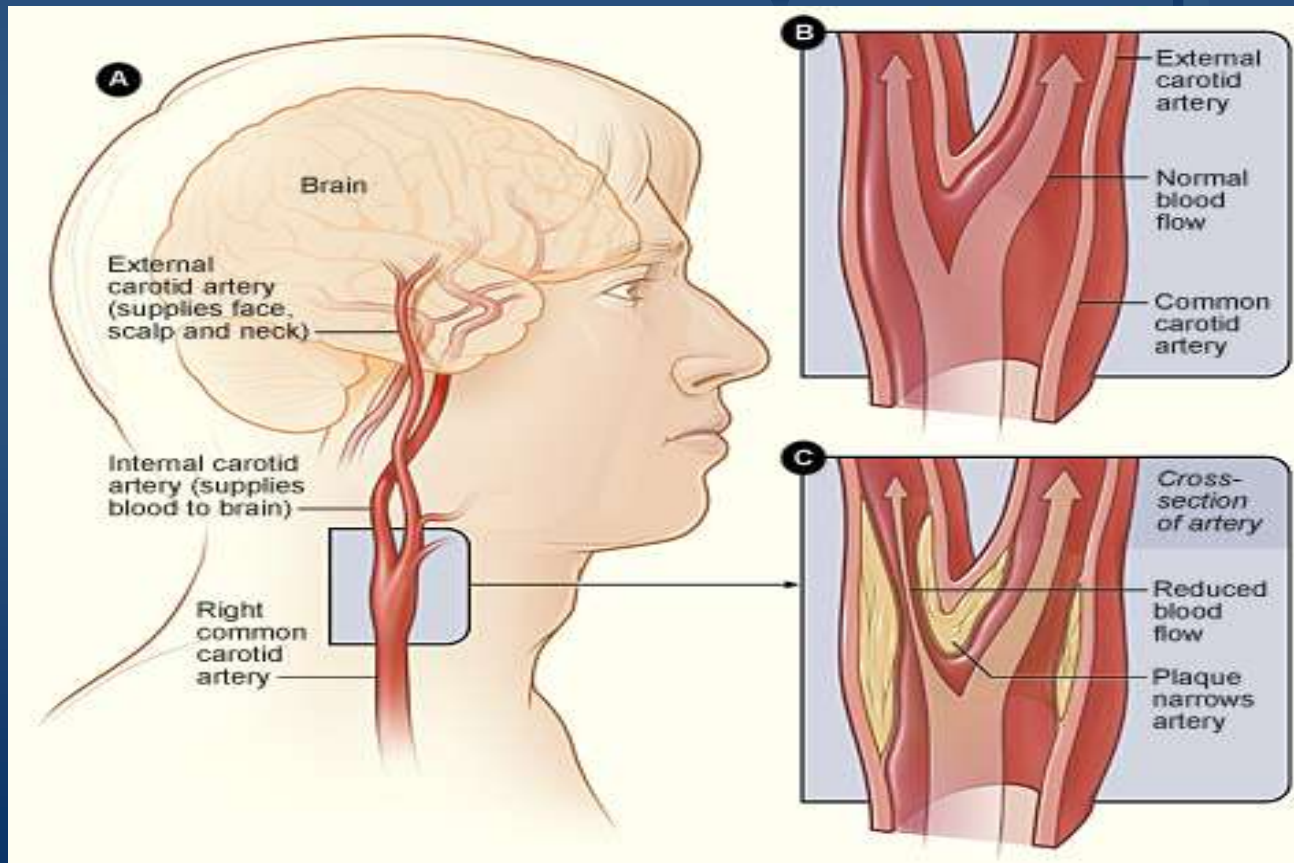


ATEROM PLAĞI

(Büyük ve orta arterlerin intima ve mediasında)

Stenoza yol açan lezyonun en sık yerleşim yeri;

- Proksimal internal karotis arter
- Karotis arter bifurkasyonu



Hangi hastalara CEA yapılmalı?

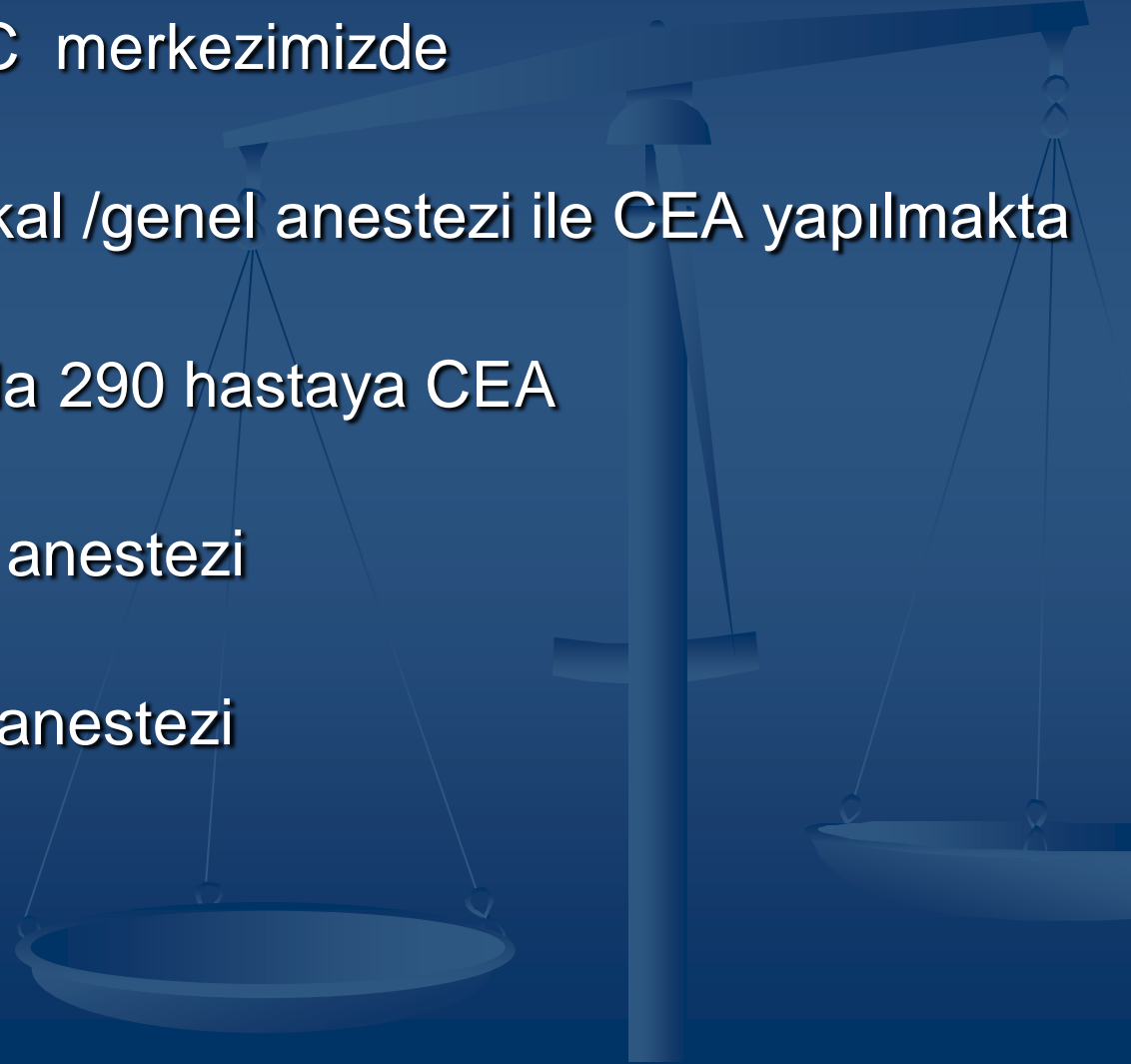
- *Asemptomatik 80% karotis stenozu
6% riski inme / yıl
- *Semptomatik >50% karotis stenozu
bir yılda CVA 10% riski ve 5 yılda
40%



İNME

İSKEMİK	EMBOLİK	POST OPERATİF	ŞANT YERLEŞTİRİLMESİ
Karotis arterin klempe edilmesi sonrası Yetersiz serebral perfüzyon sonucu	CEA sırasında teknik hatalar sonucu	CEA tekniğindeki yetersizlik Reperfüzyon hasarı ve kan basıncındaki oynamalar	Hava embolisi Ateroklerotik plak varlığı Karotis arter diseksiyonu

- İlk CEA uygulaması: 1954, St Mary's Hastanesi, Londra
- Dr. Siyami Ersek GKDC merkezimizde
 - 1990 yılından beri lokal /genel anestezi ile CEA yapılmakta
 - 2007 – 2010 yıllarında 290 hastaya CEA
 - 195 hastaya lokal anestezi
 - 95 hastaya genel anestezi



İntraoperatif serebral kan akımının monitorizasyonu

- Karotid arter stump basınç ölçümü
- EEG takibi
- Somatosensoriyal uyarılmış potansiyel
- Transkraniyal dopler ---orta serebral arter
- Near infrared spektroskopi (NIRS)
- Devamlı jugular ven oksimetre
- BIS

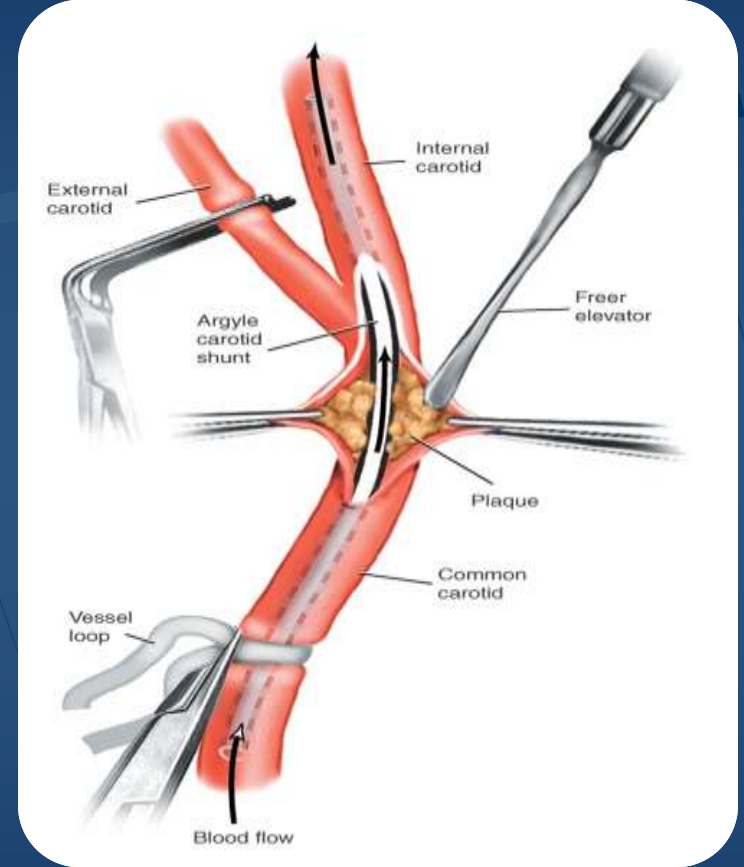
Yetersiz serebral kan akımının tespit etmede bu tekniklerin hepsinin duyarlılığı ve özgüllüğü nispeten zayıftır.

➤ Şant yerleştirilmesi

Kommon karotid artere ve internal karotid arter arasına serebral kan akımını korumak amacıyla takılır.

■ Stump basıncı

- Willis poligonu ↔ -ICA
- Basınç 30-50 mmHg
- CEA uygulanan uyanık hastalarda karotid arter stump basıncı ile nörolojik değişimler arasında korelasyon



- LA ile uyanık hastada operasyon sırasında gelişen nörolojik değişimler indirekt olarak serebral kan akımının yeterliliğini göstermektedir.
- Konuşma bozukluğu ve motor güç kaybı yetersiz serebral kan akımını ve şant yerleştirme gerekliliğini göstermektedir.



Regional anaesthesia for carotid endarterectomy :Stoneham,
Br J Anaesth 1999; 82: 910–19

A Review of Recent Developments in the Management of Carotid Artery Stenosis. Ritesh Maharaj.

Journal of Cardiothoracic and Vascular Anesthesia, Vol 22, 2 . 2008: 277-289

Table 3. Cerebral Monitoring Compared With the Awake Patient

Modality	False-Positive	False-Negative
Awake	Gold standard	Gold standard
Stump pressure	20%-40%	0%-23%
Stump pressure index	40%	0%
Transcranial Doppler	4%-45%	Up to 17%
EEG	5%-13%	5%-25%
NIRS	Unknown	Unknown
SSEP	Unknown	Unknown

NOTE. Stump pressure index = (stump pressure × 100)/systemic pressure.

Is Routine Intravascular Shunting Necessary for Carotid Endarterectomy in Patients with Contralateral Occlusion? A Review of 5-Year Experience of Carotid Endarterectomy with Local Anaesthesia.

Cinar B. Eur J Vasc Endovasc Surg. 2004 Nov;28(5):494-9.

- 1998 ve 2003 yılları arasında,
- 429 hasta lokal anestezi altında uyanık nörolojik test
- Lokal anestezi tekniğinde kontralateral carotid arter oklüzyonu (CCO) olan ve olmayan (non-CCO) hastalar arasında karotid şant kullanım oranında (% 10.9 vs. % 9.1) anlamlı fark bulunmamıştır.
- stroke oranı CCO ve non-CCO olan vakalarda % 3.6 ve %0.5

Genel Anestezi

Avantajları

- Hava yolu kontrolü ve ventilasyon
- Serebral koruma
 - *serebral metabolik hız azalır.
- Normokapninin korunması
- Kan basıncının kontrolü

Dezavantajları

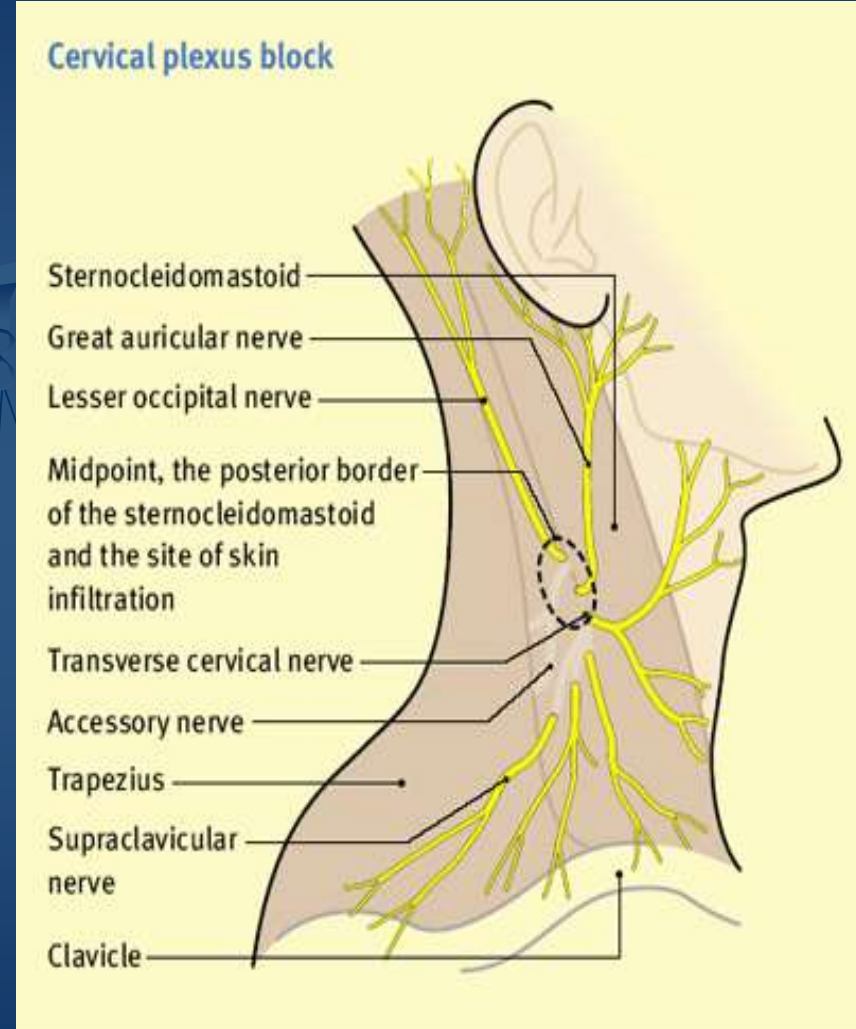
- Kross klemp sırasında serebral kan akımının monitorizasyonu
- Şant ihtiyacında artış
- Postoperatif bulantı kusma
- Yoğun bakımda kalış süresinde uzama

LOKAL ANESTEZİ TEKNİKLERİ

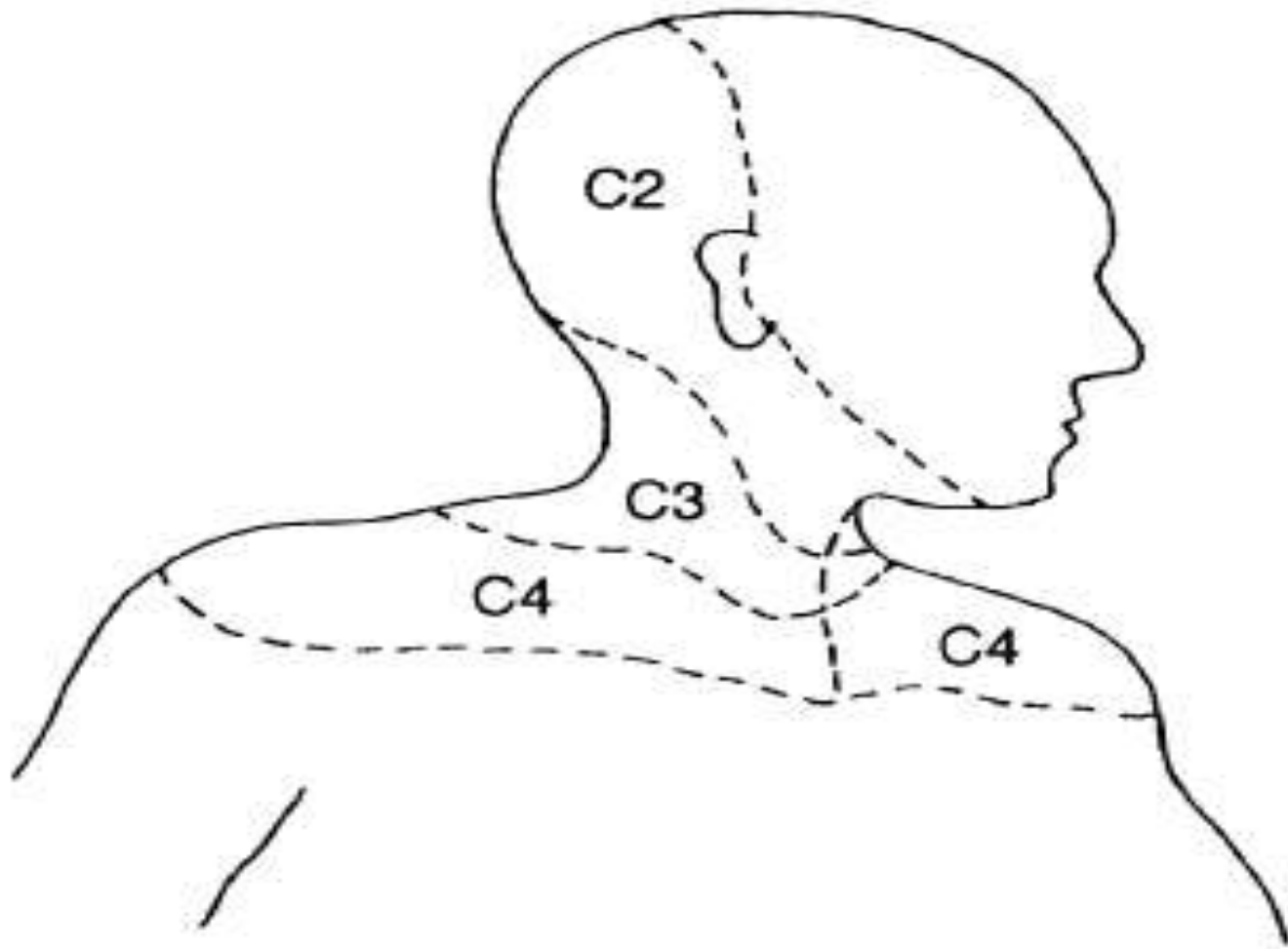
- Lokal infiltrasyon
- Yüzeyel servikal blok
- Derin servikal blok
 - *Winnie ilk kez C4 seviyesinde tek enjeksiyon
 - *Moore 3 ayrı noktadan enjeksiyon tekniği (C2, C3, ve C4)
- Servikal epidural anestezi
- Derin ve yüzeyel servikal blok kombinasyonu

ANATOMİ

- Servikal pleksus ilk 4 servikal sinirin (C1-2-3-4) ön dallarından oluşur. Yalnız C2-3-4 servikal sinirler bloke edilir. C1 yalnız motor lifler içerir.
- Sinirler sulkusu terkederken üst ve alt dallara ayrılır, bu dallar da birbirleri ile birleşerek bir seri lup oluşturur ve servikal pleksus adını alır.
- Transvers çıkıntının tüberkülü cildin 1,5 - 3,5 cm altında bulunur.
- Süperfisial dallar sternokleidomastoidin arka kenarı boyunca uzanır, boyun ve omuz cildi ile yüzeyel dokuları innerve eder.



Servikal dermatomların anatomisi

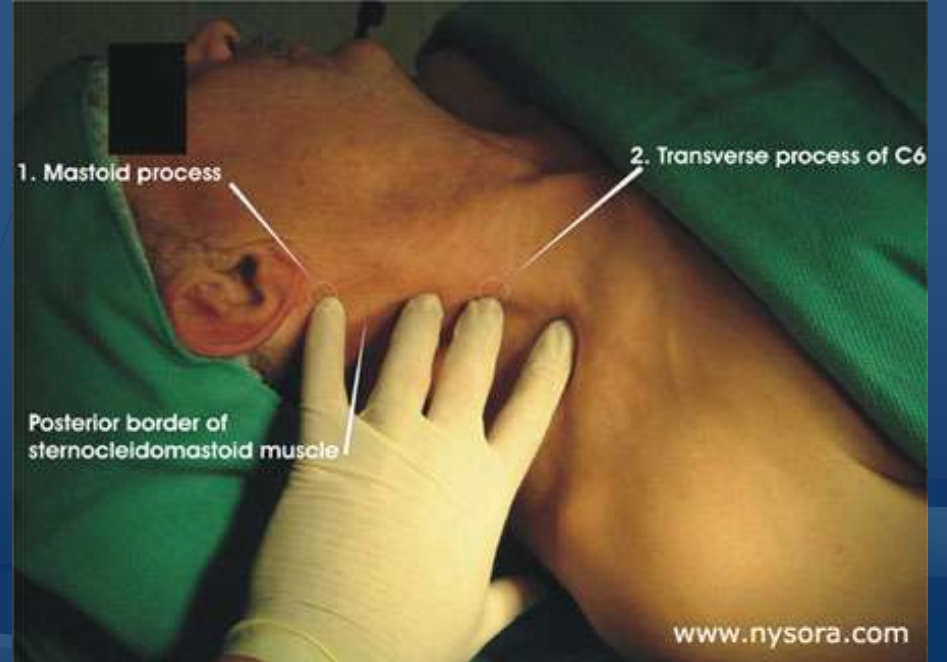


Derin servikal blok

Referans noktaları

- 1-Mastoid çıkıntı
- 2- C6 Chassaignac's tüberkül
- 3- sternokleidomastoid kasın arka sınırı

**üç noktanın oluşturduğu hayali çizginin 1 cm altından paralel bir çizgi daha çizilir.
**mastoid kemikten 1 cm aşağısı C2 olarak kabul edilir.

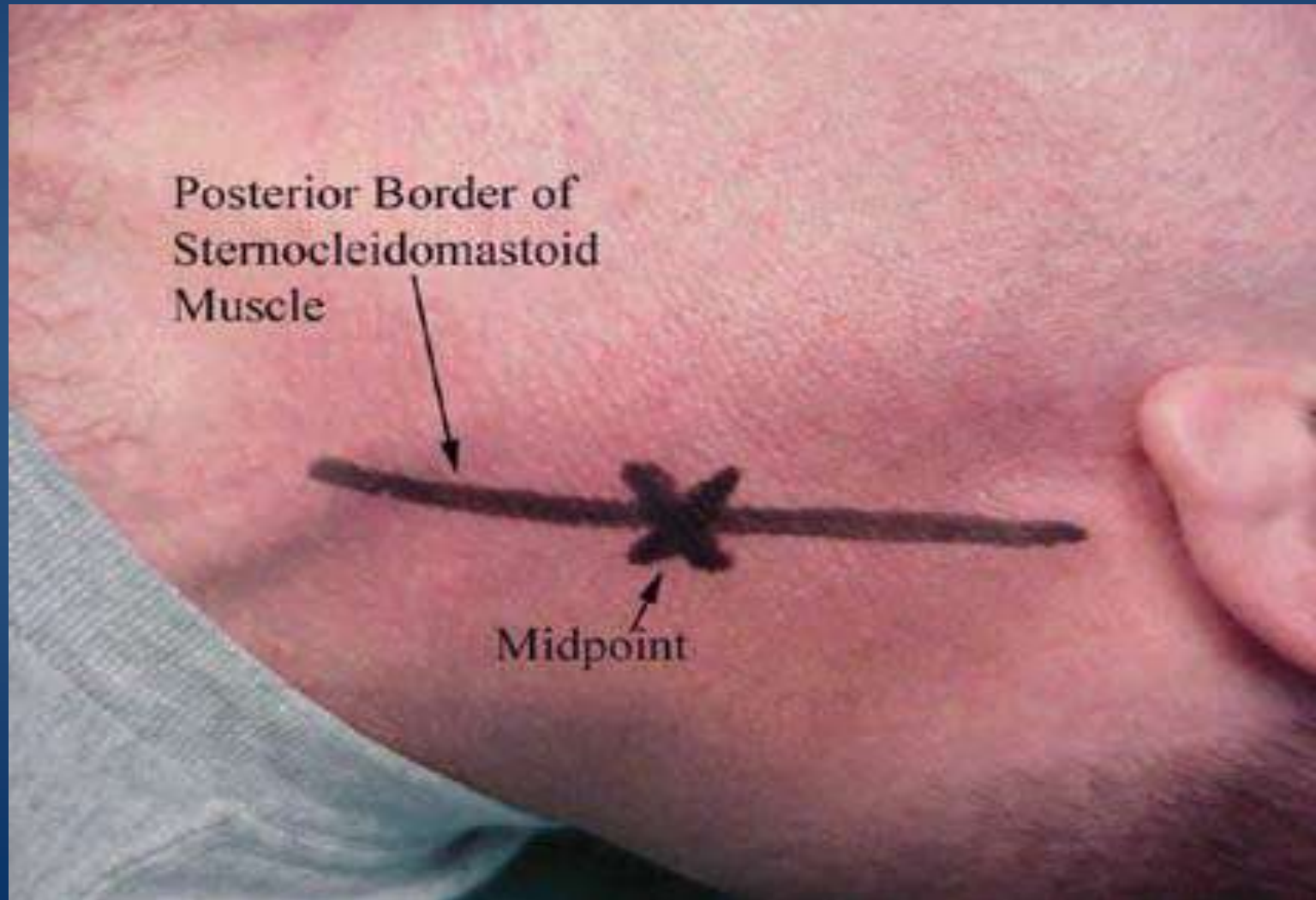


➤ Üç iğne ile C2, C3 ve C4 transvers prosesine 6-8 mL 0.5 % bupivakain enjeksiyonu yapılır.



- Bupivacaine 0.5%
- Ropivacaine 0.75-1 %
- Mepivacaine 2 %.

Yüzeyel servikal blok



Yüzeyel servikal blok



İğne sternokleidomastoid kasının posterior kenarının hemen arkasından önce cilde dik olarak girilir. 3 - 5 ml lokal anestetik subkütan olarak enjekte edilir



İğne daha sonra inferiora yönlendirilir ve 3 - 5 ml lokal anestetik enjekte edilir



İğne bu kez superiora yönlendirilir ve 3 - 5 ml lokal anestetik de bu alana enjekte edilir

Cervical plexus anesthesia for carotid endarterectomy: comparison of ropivacaine and mepivacaine.

Albino Leoni MD, Can J Anesth 2000 / 47: 2 / 185–187

TABLE II Time required for onset of deep cervical plexus anesthesia, and total intraoperative consumption of supplemental lidocaine and fentanyl, nitrate, and fenilephrine after cervical plexus anesthesia performed with either 0.75%, 1% ropivacaine, or 2% mepivacaine.

	<i>Ropivacaine</i> _{0.75%} (<i>n</i> = 20)	<i>Ropivacaine</i> _{1%} (<i>n</i> = 20)	<i>Mepivacaine</i> (<i>n</i> = 20)
Onset of Deep Cervical Block (min)	15 (10 - 25)	18 (9 - 20)	15 (5 - 20)
Intraoperative Lidocaine 1% consumption (ml)	7 (0 - 30)	5 (0 - 25)	9 (0 - 30)
Intraoperative Fentanyl consumption (mg)	0 (0 - 0.15)	0 (0 - 0.05)	0 (0 - 0.1)
Intraoperative Nitrate consumption (mg)	2 (0 - 6)	2 (0 - 8)	2 (0 - 15)
Intraoperative Fenilephrine consumption (mg)	1 (0 - 8)	0 (0 - 2)	1 (0 - 5)

Data are presented as median (range).

Prospektif, randomize ,çift-kör çalışmada ropivakain ile mepivakainin blok etkilerinin benzer olduğu gösterilmiştir.

Lokal anestezinin avantajları

- *Nörolojik durumun takibi*
- *Şant ihtiyacında azalma*
- *Kan basıncının korunması ve vazopresör ihtiyacında azalma*
- *Kardiyovasküler morbitede azalma*
- *Yoğun bakımda kalış süresinde kısalma*
- *Entübasyondan kaçınma KOAH vb*
- *Daha ucuz*

*Carotid endarterectomy under local anesthesia: single institutional Experience. Yusuf Kalko. Interact CardioVasc Thorac Surg 2006;5:570-573;

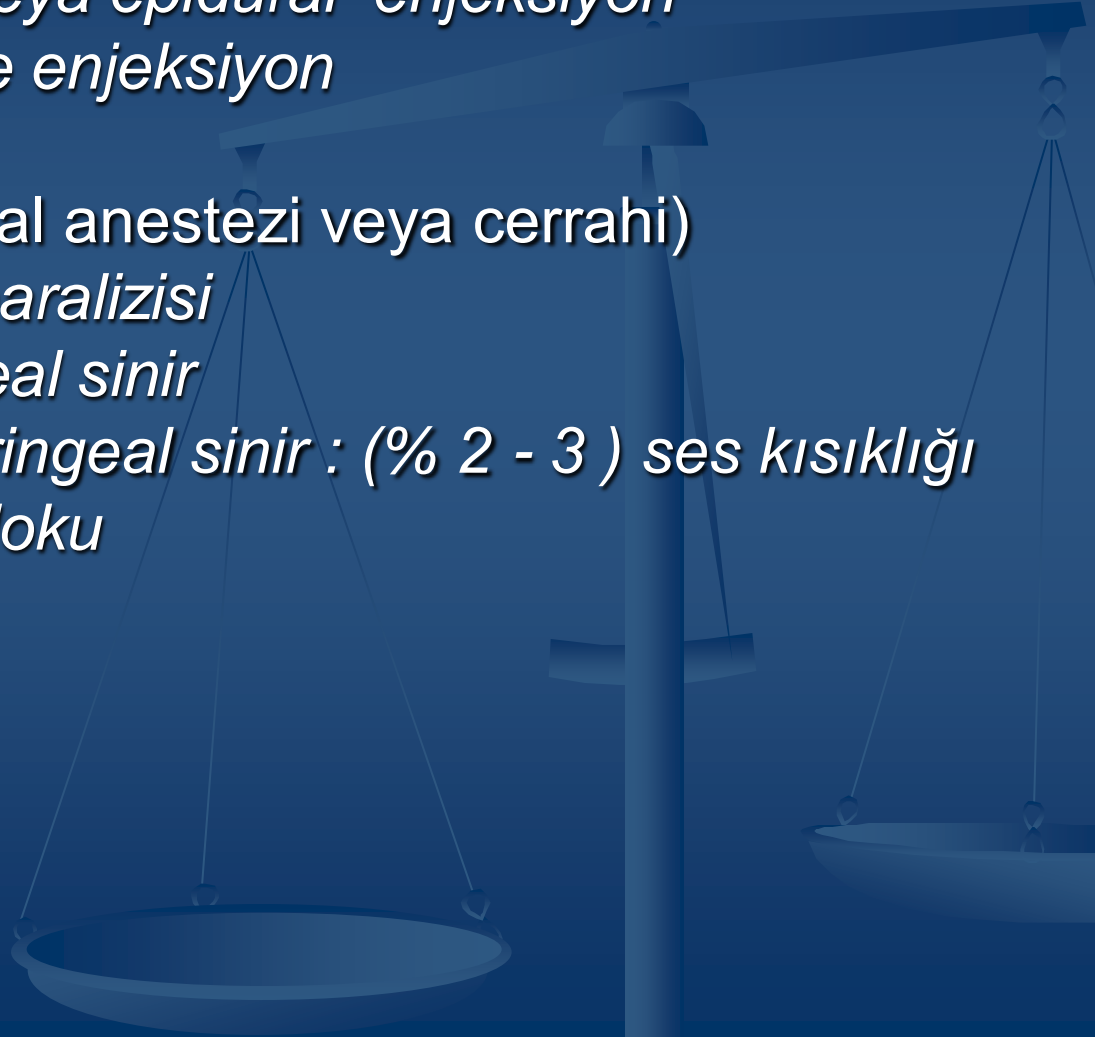
**Regional anaesthesia for carotid endarterectomy : Stoneham, Br J Anaesth 1999; 82: 910–19

Lokal anestezinin dezavantajları

- *Acil durumlarda hava yolu kontrolünde yetersizlik*
- *Miyokardial iskemi*
- *Hastada huzursuzluk, anksiyete*
- *Farmakolojik beyin korumasında yetersizlik*
- *Lokal anesteziye ve işleme bağlı komplikasyonlar*

Regional anaesthesia for carotid endarterectomy :
Stoneham, Br J Anaesth 1999; 82: 910–19

KOMPLİKASYONLAR

- Sistemik toksik reaksiyon
 - **Subaraknoid veya epidural enjeksiyon*
 - **vertebral artere enjeksiyon*
 - Sinir blokajı (regional anestezi veya cerrahi)
 - **Frenik sinir paralizisi*
 - **Glassofaringeal sinir*
 - **Rekürrent laringeal sinir : (% 2 - 3) ses kısıklığı*
 - **Vagus sinir bloku*
 - Horner sendromu
 - Disfaji
 - Hematom lokal
 - Enfeksiyon
- 

Regional anaesthesia for carotid endarterectomy :

Stoneham, Br J Anaesth 1999; 82: 910–19

Table 1 Postoperative problems after carotid endarterectomy

- Cardiovascular
 - Hypotension
 - Hypertension (particularly after carotid sinus nerve section or local anaesthetic block)
 - Arrhythmia
 - Myocardial ischaemia
 - Airway obstruction caused by oedema or haematoma
 - Neurological deficit—requires immediate surgical opinion
 - Hyperperfusion syndrome—headache, seizures, haemorrhage
-

CEA komplikasyonları

Table 6. Complications After CEA^{65,153-158}

Potential Complications of CEA	%
Cardiovascular	
Hypertension	20
Hypotension	5
Unstable blood pressure	73.5
MI	1.0
Angina pectoris	1.3
Arrhythmia	1.0
Neurologic	
Stroke	2-7
Hyperperfusion syndrome	0.4
Cranial nerve injury	4-7
Intracerebral hemorrhage	0.6
Seizures	0.4-0.6
Carotid artery	
Thrombosis	
Dissection	
Restenosis	
Wound	
Hematoma	5.5
Re-exploration	1.4
Infection	1
Mortality	1

A Review of Recent Developments in the Management of Carotid Artery Stenosis
Ritesh Maharaj.

A Comparison of Superficial Versus Combined (Superficial and Deep) Cervical Plexus Block for Carotid Endarterectomy: A Prospective, Randomized Study.

Jaideep J. Pandit, *Anesth Analg* 2000;91:781–6

- Randomize, 40 hastada iki teknik karşılaştırıldı.
- Postoperatif ağrı skoru, cerrahi öncesi ve cerrahi sırasındaki sedasyon ve analjezik gereksinimi, postoperatif analjezik gereksinimine bakıldı.
- intraoperatif ek doz lidokain kullanımı arasında anlamlı fark bulunmamıştır.
- İki teknik arasında anlamlı fark bulunamamıştır.

Superficial or deep cervical plexus block for carotid endarterectomy: a systematic review of complications[†]

British Journal of Anaesthesia 99 (2): 159–69 (2007)

J. J. Pandit¹ *, R. Satya-Krishna² and P. Gration¹

Yüzeyel ve derin servikal blok

komplikasyonlarının sistematik incelemesi;

- Blok yeri ile ilişkili ciddi komplikasyonlar
- Genel anesteziye dönüş insidansı
- Ciddi cerrahi ve anesteziye bağlı sistemik komplikasyonlar

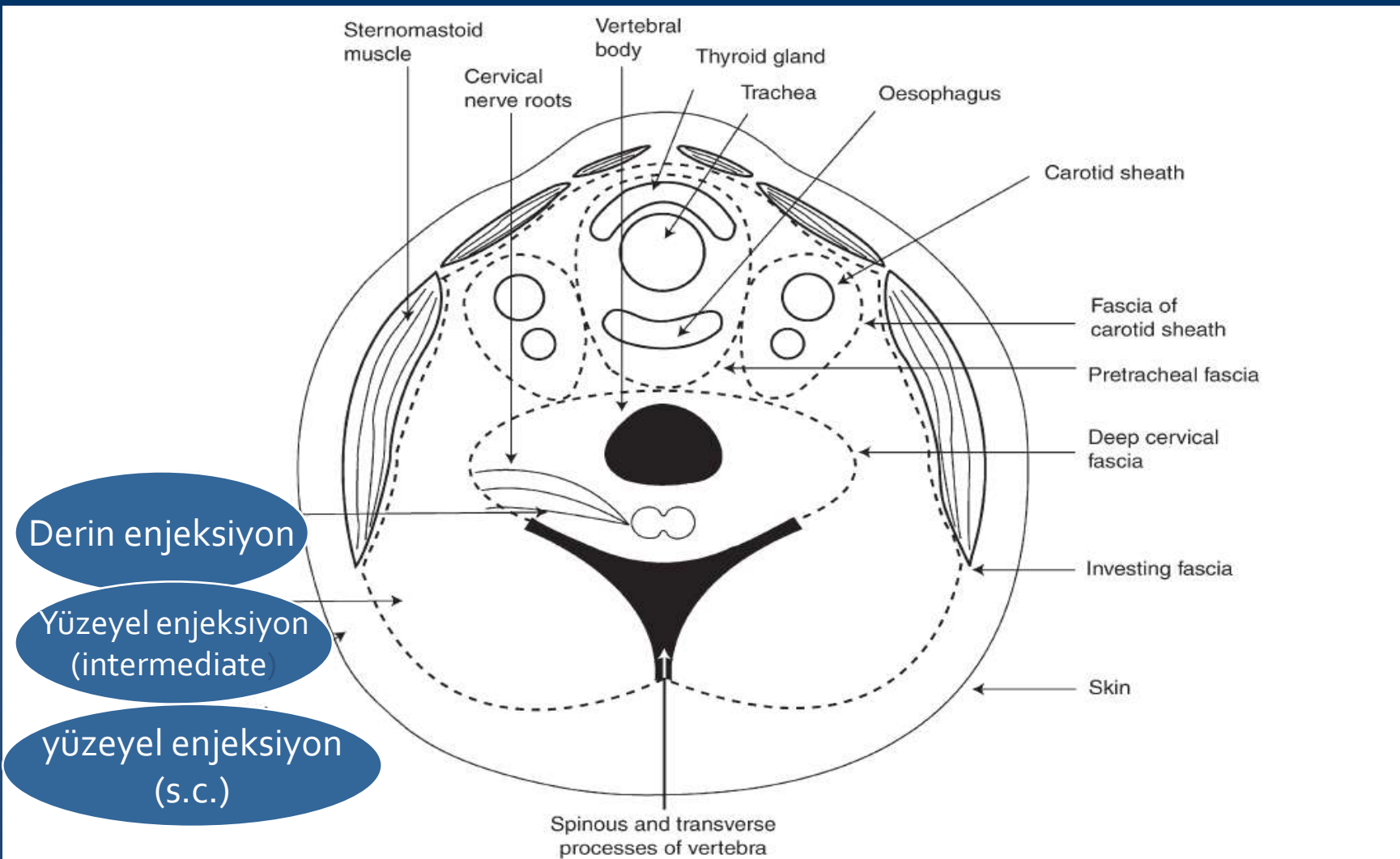


Fig 1 Drawing of a cross-section of the neck at the C4 vertebral level, showing the sites of injection of the deep, intermediate, and superficial blocks (adapted from Pandit and colleagues⁸⁰).

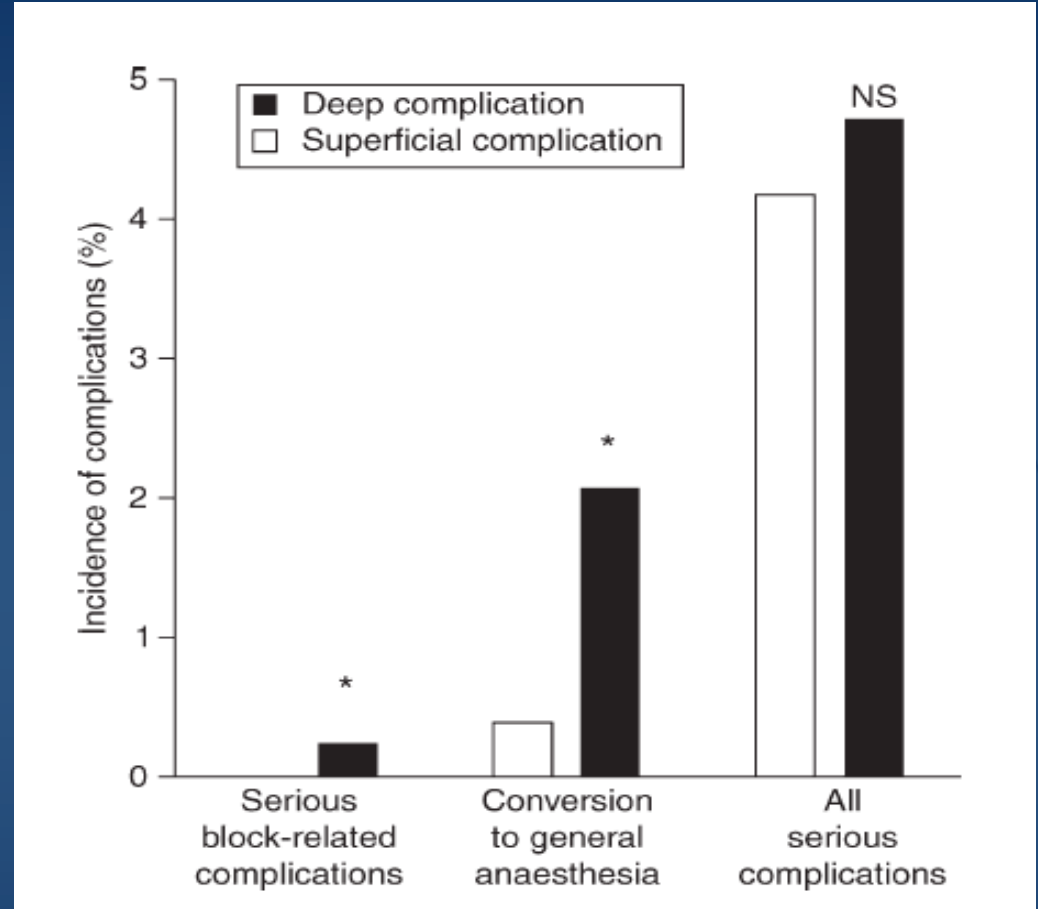
Superficial or deep cervical plexus block for carotid endarterectomy: a systematic review of complications. J. Pandit; British Journal of Anaesthesia 99 (2): 159–69 (2007)

69 yayın tarandı;

*7558 derin/ kombine servikal blok

*2533 yüzeysel / intermediate servikal blok

Blok sırasında dokularda iğne ile yaralanma ,hematom



Yüzeysel / intermediate servikal blok daha güvenli

Comparison between local and general anaesthesia for carotid endarterectomy. A retrospective analysis:

G. Santamaria, *Minerva Anestesiol* 2004;70:771-8

- Serebral kan akımının korunması
- Şant kullanımının azalması
- Daha ekonomik
- Yoğun bakımda kalış süresi daha kısa

- LA- 10 ml ropivakain 7.5% 6
- GA-propofol 2-2.5 mg/kg idamede sevofluran 2-3% ve N2O-O2 (60-40%) veya hava-O2

CEA de lokal anestezi daha uygun

TABLE II.—*Postoperativa complications.*

	Local anaesthesia		General anaesthesia	
	Group A	Group B	Group C	Group D
Deaths	0	0	0	2
Permanent stroke	0	0	1	0
Transient stroke	2	0	1	1
Upper laryngeal nerve paralysis	2	1	3	0
Lower laryngeal nerve paralysis	0	1	2	1
Jacksonian crisis	1	0	0	1

Local Versus General Anesthesia for Carotid Endarterectomy: Report of 329 Cases

Onur Gürer, MD, Fikri Yapıcı, MD, Yavuz Enç, MD, Bayer Çınar, MD, Bülend Ketenci, MD, and Azmi Özler, MD, *Istanbul, Turkey*

Table IV. Perioperative data; intensive care unit and hospitalization time.

	Group I	Group II	p Value
Intraoperative MAP	100 ±7	124 ±5	<0.0001
Antihypertensive medication, %	18.18	22	NS
Cross-clamp time, minutes	18.2 ±5	14.6 ±4	<0.0001
Operation time, minutes	122 ±36	104.5 ±24	<0.0001
Shunt usage, %	30.3	8	<0.0001
Patchplasty, %	9.1	7	NS
ICU time, days	1 ±0.5	1 ±0.3	NS
Hospitalization time, days	4.1 ±1.9	2.4 ±1.1	<0.0001

MAP: mean arterial pressure; ICU: intensive care unit; NS: nonsignificant.

Table V. Mortality and morbidity rates.

	Group I	Group II	p value
Mortality, %	1.2	0.5	NS
Stroke, %	7.3	1	p<0.05
TIA, %	2.4	2	NS
Cranial nerve injury, %	1.2	0.5	
MI, %	1.2	0.5	
Wound infection, %	0.6	0.5	2.5 NS
Hematoma, %	0.6	1	

TIA: transient ischemic attack; NS: nonsignificant.

Grup1 :GA Grup2:LA

Local Versus General Anesthesia for Carotid Endarterectomy: Report of 329 Cases

Onur Gürer, MD, Fikri Yapıcı, MD, Yavuz Enç, MD, Bayer Çınar, MD, Bülend Ketenci, MD, and Azmi Özler, MD, *Istanbul, Turkey*

Table VI. Summary of the results of some large series.

	Mortality	Stroke	TIND	NNM
Rockman et al, ¹⁶ 1996				
General anesthesia	1.5*	2.2*		
Local anesthesia				
Buchbinder et al, ¹⁷ 1997				
General anesthesia	0.7	2.2		2.9
Local anesthesia	0	2		0.4
Fiorani et al, ¹⁸ 1997				
General anesthesia	0.7*	3.2		
Local anesthesia		1.3		
Bowyer et al, ¹⁹ 2000				
General anesthesia	0.87	5.26†	3.51	14.5
Local anesthesia	0.78	1.1†	4.78	12.1
SEGTKDCM, 2001 (present study)				
General anesthesia	1.2	7.3†	2.4	3.6
Local anesthesia	0.5	1†	2	2.5
Nonrandomized series, ¹⁵ 2001				
General anesthesia		6.1†		5.1
Local anesthesia		2.2†		3.7

TIND: transient ischemic neurologic deficit; NNM: nonneurologic morbidity; MI: myocardial infarction; SEGTKDCM: Dr. Siyami Ersek Thoracic and Cardiovascular Surgery Center.

*Total significant value of general and local anesthesia groups. †Significant value.

Local Versus General Anesthetic for Carotid Endarterectomy.

Kittipan Rerkasem, MD , Stroke 2009;40:e584-e585

Table. Odds of Operative Complications During the 30 Days After Surgery in 10 RCT of Carotid Endarterectomy Performed With LA vs GA

Outcome	LA Event/Cases	GA Event/Cases	OR	95% CI	I ² (%)
Stroke	72/2111	77/2081	0.92	0.67–1.28	0
Death	20/2057	32/2026	0.62	0.36–1.07	0
Stroke or death	78/2057	90/2026	0.85	0.63–1.16	0
MI	14/2111	9/2081	1.53	0.67–3.47	0
Local hematoma	154/2002	160/1974	0.95	0.75–1.19	47
Cranial nerve injury	217/1946	186/1919	1.17	0.95–1.44	0
Use of arterial shunt	304/1959	798/1941	0.27	0.23–0.31	91

GA indicates general anesthesia; I², heterogeneity.

randomize kontrollü çalışmalar (RCT)

Regional or General Anesthesia for Carotid Endarterectomy? Evidence From Published Prospective and Retrospective Studies

Joanne Guay, MD, FRCPC

Journal of Cardiothoracic and Vascular Anesthesia, Vol 21, No 1 (February), 2007: pp 127-132

Meta-analiz

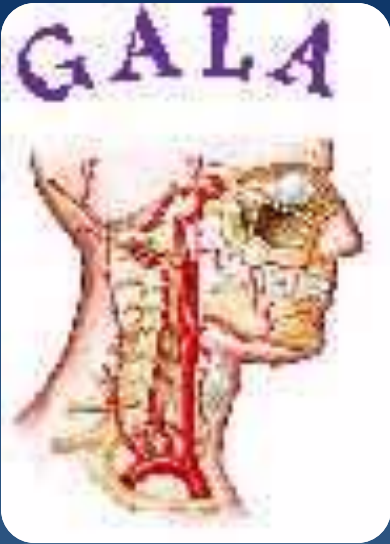
- Amaç: CEA yapılan hastalarda GA ve LA teknikleri;
 - *Yeni nörolojik bozulma
 - *Stroke
 - *Stroke ve/veya ölüm
 - *Ölüm
 - *Miyokard enfarktüsü açısından karşılaştırılmıştır.

Table 1. Regional or General Anesthesia for Carotid Endarterectomy Results For Primary Outcomes

	Number of Studies (References)	Number of Patients in Each Group RA/GA	Percentage of Event With RA	Percentage of Event With GA	Odds Ratio (95% confidence interval)*	p Value
Randomized controlled trials						
Any new neurologic deficit	4 (9,10,13,14)	189/189	4.8	3.7	1.30 (0.48-3.57)	0.60
Stroke	6 (9-14)	236/232	2.1	2.2	1.01 (0.32-3.18)	0.98
Combined stroke and/or death	6 (9-14)	236/232	2.5	3.9	0.70 (0.26-1.87)	0.47
Death	6 (9-14)	236/232	0.4	3.0	0.29 (0.07-1.19)	0.08
Myocardial infarction	5 (9,11-14)	186/182	3.2	3.9	0.87 (0.29-2.64)	0.80
Prospective studies						
Any new neurologic deficit	12 (5,9,10,13-21)	888/897	2.9	4.3	0.72 (0.44-1.19)	0.20
Stroke	14 (5,9-21)	935/940	1.1	2.2	0.56 (0.29-1.08)	0.09
Stroke and/or death	14 (5,9-21)	935/940	1.4	3.0	0.53 (0.29-0.96)	0.04
Death	14 (5,9-21)	935/940	0.4	1.2	0.54 (0.23-1.31)	0.17
Myocardial infarction	11 (5,9,11-14,16,17,19-21)	653/614	1.2	2.4	0.63 (0.28-1.39)	0.25
All studies						
Any new neurologic deficit	36 (1-6,9,10,13-29,31-33,35,36,38,40,41,47,49,50)	5,202/5,020	2.7	4.6	0.60 (0.48-0.75)	<0.00001
Stroke	45 (1-5,9,29,31-41,43-50)	10,274/6,124	1.7	2.8	0.54 (0.43-0.68)	<0.00001
Stroke and/or death	44 (1-6,9-25,27-29,31-41,43,45-50)	6,755/5,591	2.2	3.4	0.62 (0.49-0.78)	<0.0001
Death	48 (1-6,9-50)	10,580/6,448	1.0	1.3	0.65 (0.48-0.87)	0.004
Myocardial infarction	30 (1-3,5,9,11-14,16,17,19-21,23,25-27,31-34,40,41,43-47,50)	8,424/4,283	1.1	1.9	0.50 (0.36-0.70)	<0.0001

Abbreviations: RA, regional anesthesia; GA, general anesthesia.

*If the odds ratio and its upper 95% confidence interval are lower than 1, the incidence of complications was lower in the regional anesthesia group. Likewise, if the odds ratio and its lower 95% confidence interval would be higher than 1, the incidence of complications would have been higher in the regional anesthesia group.



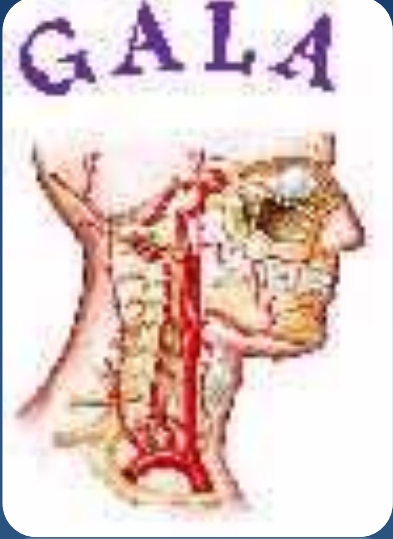
General anaesthesia versus local anaesthesia for carotid surgery (GALA): a multicentre, randomised controlled trial

GALA Trial Collaborative Group* *Lancet* 2008; 372: 2132–42

Siyami Ersek Thoracic and Cardiovascular Surgery Clinic, Turkey (104)—B Cinar, T Coruh, E Kurc, D Ozsoy, M Sargin, K Tutkavul, I Yekeler;

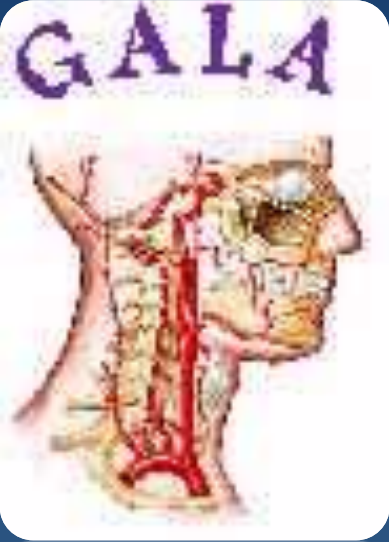
- Uluslararası çok merkezli randomize çalışmada CEA cerrahisinde GA ile LA karşılaştırılmıştır.
- Perioperatif inme tanıma ve korumanın lokal anesteziye göre daha kolay olabileceği düşünülmüştür.

Yöntem



- 3526 hasta, 95 merkezli, 24 ülke
- Semptomatik veya asemptomatik internal karotis arter stenozlu hastalar seçildi.
- Genel anestezi (n=1753) ve lokal anestezi (n=1773)
- haziran 1999 - ekim 2007 arası
- Hastalarda perioperatif ve postoperatif 30 günlük **primer sonuç**
 - İnme (retinal enfarkt dahil)
 - Miyokard enfarktüsü
 - Ölüm oranlarına bakılmış.

Bulgular



Genel anestezi yapılan hastalarda primer sonuç : 84 (4.8%)

Lokal anestezi yapılan hastalarda primer sonuç :80 (4.5%)

İki grup arasında ;

**Hayat kalitesi*

**Hastanede kalış süresi*

**Primer sonuçlar*

arasında anlamlı fark bulunamamıştır.

Primary outcomes between randomisation and 30 days after anaesthesia (or after randomisation for patients who were not anaesthetised)

	General anaesthesia	Local anaesthesia
Post-surgery or physician follow-up complete	1752	1771
Stroke*	70 (4.0%)	66 (3.7%)
Fatal	15	11
Non-fatal	55	55
Modified Rankin 6 months after stroke		
0-2	41	40
3-5	14	14
Dead	15	12
Ipsilateral to surgery	54	57
Contralateral to surgery	15	7
Vertebrobasilar	1	2
Cerebral infarction	37	41
Retinal infarction	2	3
Cerebral haemorrhage	11	7
Unknown pathology	20	15
Events prevented per 1000 patients with local anaesthesia (95% CI)	..	3 (-10 to 16)
Myocardial infarction	4 (0.2%)	9 (0.5%)
Fatal	1	3
Non-fatal	3	6
Events prevented per 1000 patients with local anaesthesia (95% CI)	..	-3 (-8 to 2)
Other vascular death	9	5
Stroke (onset before randomisation)	1	0
Coronary heart disease, sudden	2	0
Sudden death without further information	1	1
Other coronary heart disease	2	3
Other cardiac (non-coronary)	2	0
Aortic aneurysm rupture	1	0
Pulmonary embolism	0	0
Other	0	1

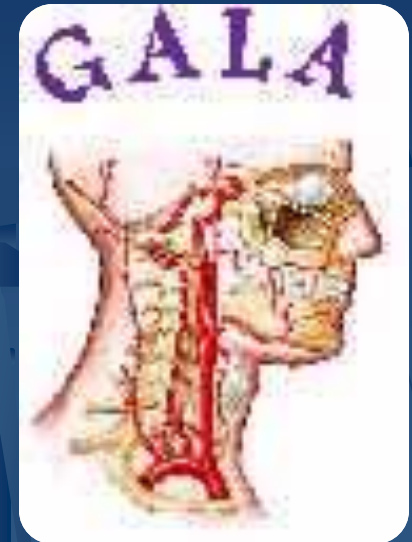
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	General anaesthesia	Local anaesthesia
(Continued from previous column)		
Non-vascular death	0	0
Unknown cause of death	1	0
Death (any cause)	26 (1.5%)	19 (1.1%)
Events prevented per 1000 patients with local anaesthesia (95% CI)	..	4 (-3 to 12)
Stroke (including retinal infarction) or death	81 (4.6%)	74 (4.2%)
Events prevented per 1000 patients with local anaesthesia (95% CI)	..	4 (-9 to 18)
Stroke (including retinal infarction), myocardial infarction, or death	84 (4.8%)	80 (4.5%)
Events prevented per 1000 patients with local anaesthesia (95% CI)	..	3 (-11 to 17)

Data are number (%) or number (95% CI). Only one event per patient has been counted. If a patient had multiple events, the event included in this table is the fatal one (if there was one), and the first non-fatal one for all other patients. Stroke events are counted in preference to coronary events, and severe events are counted over non-severe events. *The number of fatal strokes is different from the number of deaths 6 months after the stroke outcome event, because one patient died exactly 6 months after the stroke outcome event of an unknown cause. There were two events in patients receiving general anaesthesia and two in patients receiving local anaesthesia (one stroke and one death in each group) after randomisation but before surgery could be done (surgery was cancelled in all cases).

Table 4: Primary outcomes between randomisation and 30 days after anaesthesia (or after randomisation for patients who were not anaesthetised)

Cerrahi ve anestezi yöntemleri



	General anaesthesia	Local anaesthesia
Post-surgery form received and anaesthesia administered	1720	1730
Trainee surgeon*	242 (14%)	210 (12%)
Trainee anaesthetist†	246 (16%)	213 (14%)
Duration of surgery (min)‡	93 (33.6)	93 (36.0)
Premedication used§	905 (53%)	877 (51%)
Type of surgery¶		
Conventional	1237 (78%)	1145 (72%)
Eversion	317 (20%)	409 (26%)
Exploration only	3 (0.2%)	4 (0.3%)
Other		
Procedure abandoned		

Shunt used	General anaesthesia	Local anaesthesia
Reasons for using a shunt (Neurological deterioration applicable in patients receiving general anaesthesia)		
Used routinely	409	451
Drop in velocity on TCD	45	31
Unable to use TCD	58	51
Contralateral carotid occlusion or near occlusion	38	51
Low stump pressure	108	151
Contralateral carotid stenosis (but not occluded or nearly occluded)	4	71
Recent stroke	5	31
Unusual or damaged veins or arteries in head or neck	2	21
EEG or evoked potentials changed	8	11
Blood pressure dropped	4	11
Falling brain oxygen levels	1	0
Operation converted to vein bypass	1	0
Unknown	89	21

Shunt used	General anaesthesia	Local anaesthesia
	738 (43%)	248 (14%)

Blood pressure manipulation**	General anaesthesia	Local anaesthesia
Manipulated up	667 (43%)	267 (17%)
Manipulated down	208 (13%)	433 (28%)
Manipulated up and down	259 (17%)	153 (10%)
Not manipulated	435 (28%)	717 (46%)

Data are number (%) of patients. †Duration of surgery (min) recorded in first 149 patients receiving general anaesthesia and 1717 receiving local anaesthesia. ‡Use of premedication unknown for two patients receiving general anaesthesia and three receiving local anaesthesia. ¶Type of surgery not recorded in first 137 receiving general anaesthesia and 149 receiving local anaesthesia. ††Most patients who had these reasons for using shunts received the opposite type of anaesthetic. All six patients allocated to general anaesthesia who received a shunt because of neurological deterioration received the opposite type of anaesthetic (local anaesthetic). 50 of 77 (65%) patients receiving local anaesthetic with reasons for using shunts other than neurological deterioration received the opposite type of anaesthetic (26 patients) or converted (24 patients). **Blood-pressure manipulation not recorded in first 151 receiving general anaesthesia and 160 receiving local anaesthesia. †††Intra-operative heparin use unknown for one patient receiving general anaesthesia.

Table 3: Surgical and anaesthetic procedure

Sonuç olarak;

- CEA cerrahisinde bölgesel blok uygulaması;
***anlık bilinç deęişikliğinden inme hatta ölümle sonuçlanabilecek komplikasyonların erken anlaşılması ve şant ihtiyacının tespitinde daha avantajlı bir yöntemdir.*

