MİYASTENİK HASTADA TORASİK ANESTEZİ

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AKIŞ

- Miyastenia genel bakış
- Preoperatif değerlendirme
- Peroperatif yönetimi
- Postoperatif komplikasyonlar

Miyastenia gravis

Postsinaptik membranın OTOİMMÜN hastalığı

- **AchR (+)**
- **Reseptör ömrü ↓**

⇒ ***Nöromüsküler iletide ve kasılma gücünde azalma***

EDİNSEL MİYASTENİ	**nAch R(+) %85, diğerleri MuSK**
NEONATAL MİYASTENİ	**Miyastenik annenin plasentadan geçen antikorları**
İlaca Bağlı MİYASTENİ	**Penisilamin en sık; ilaç kesilince derlenme**
KONJENİTAL MİYASTENİ	**nAchR subunit defekti, seyrek, miyopatilerle**

Timus açısından

- **Timoma (%10)**
- **Timik hiperplazi** ***en sık, <40 yaş,*** ♀
- **Atrofik timus** ***>40 yaş,*** ♂
- **Oküler miyasteni** ***%50 seropozitif***

Diğer otoimmün hastalıklar

- **Tiroid hastalıkları**
- **Diabetes**
- **Bağ dokusu hastalıkları: SLE, RA**
- **Çölyak hastalığı**
- **Pernisyöz anemi**

Klinik

- **Kas zaafiyeti, yorgunluk**
- **Oküler miyasteni (%15)**
- **Bulber tutulum**

dizartri, çiğneme-yutma güçlüğü

Preoperatif değerlendirme

Osserman sınıflaması MGFA modifikasyonu

I	**oküler miyasteni**
IIa	**hafif jeneralize miyasteni; ekstremite tutulumu**
IIb	**jeneralize miyasteni; bulber tutulum**
III	**orta derecede jeneralize miyasteni**
IV	**ağır jeneralize miyasteni**
V	**yapay solunumda**

Preoperatif değerlendirme

Leventhal sınıflaması

- **>6yıl hastalık**
- **Piridostigmin dozu >750m/gün… >12tablet**
- **Yandaş akciğer hastalığı**

preop FVC<2.9litre

KOAH

başka…

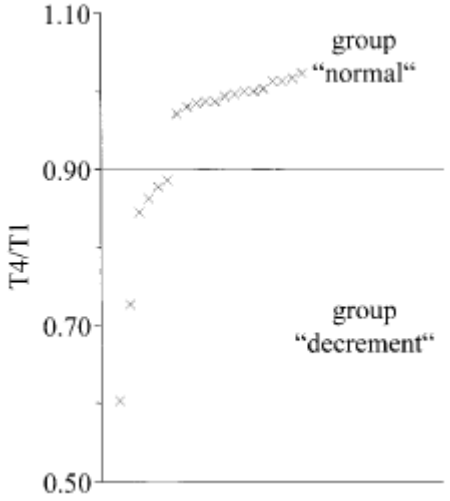
- **Bulber tutulum**
- **Preoperatif miyastenik kriz**
- **Ach antikor titresinin ↑**
- **Yandaş hastalık *kardiyak***
- **Perop transfüzyon >1litre**

Watanabe A, J Thorac Cardiovasc Surg 2004

Anesthesiology
2000; 93:346–50

Preanesthetic Train-of-four Fade Predicts the Atracurium Requirement of Myasthenia Gravis Patients

Ruth Mann, M.D., Manfred Blobner, M.D.,† Sabine Jelen-Esselborn, M.D.,‡ Raimund Busley, M.D.,§ Christian Werner, M.D.‡*



. 1. Distribution of T4/T1 ratios (n = 20).

	Normal	Decrement	*P* Value
Neuromuscular blockade (intraoperative period)			
ED_{95} atracurium (mg/kg)	0.24 ± 0.11	0.07 ± 0.03	0.002
Total atracurium ($mg \cdot kg^{-1} \cdot h^{-1}$)	0.18 ± 0.11	0.06 ± 0.04	0.032
Pyridostigmine to T4/T1 > 0.75 (mg)	2 ± 3	5 ± 4	NS

Preoperatif değerlendirme

Tedavi

1. **Antikolin esteraz: piridostigmin**
2. **İmmünsüpresif: kortikosteroid, azatioprin**
3. **Plasmaferez, i.v. Ig**
4. **Timektomi**

Surg Endosc (2008) 22:912–916
DOI 10.1007/s00464-007-9507-2

Videothoracoscopic thymectomy for nonthymomatous myasthenia gravis: Results of 90 patients

Alper Toker · Serhan Tanju · Zerrin Sungur · Yesim Parman · Mert Senturk · Piraye Serdaroglu · Sukru Dilege · Feza Deymeer

Yaş	30.9
♂/♀	%15/%85
Piridostigmin	230mg/gün
Operasyon	64dakika
Yatış	26.7saat

- 2 hastada YB
- Piridostigmin >270mg/gün daha uzun yatış

Ach esteraz tedavi (piridostigmin)

- **Ach esteraz tedavi tartışmalı**

Eisenkraft JB, Can J Anaesth 1990

Nielsson E, Anesthesiology 1990

Baraka A, Anesthesia 1993

San Filippo M, Acta Scan Anesth1997

Baraka A, Can J Anaesth 1999

- **Ach esteraz tedavi devam etsin**

Tripathi M, J Postgrad M 2003

Diğer ilaçlar ☹

- *Lokal anestetikler:* **lidokain, prokain, bupivakain, kokain**
- *Antibiyotikler:* **aminoglikozitler, kinolonlar, ampisilin, vankomisin, imipenem, metronidazol**
- *Antipsikotikler:* **lityum, klorpromazin,**
- *Antiaritmik:* **verapamil, kinidin, lidokain, betablokerler**
- **magnezyum**

Diğer ilaçlar ☹

- **Opioidler**
- **Volatil anestetikler**
- **Kas gevşeticiler**

Anestezi yönetimi

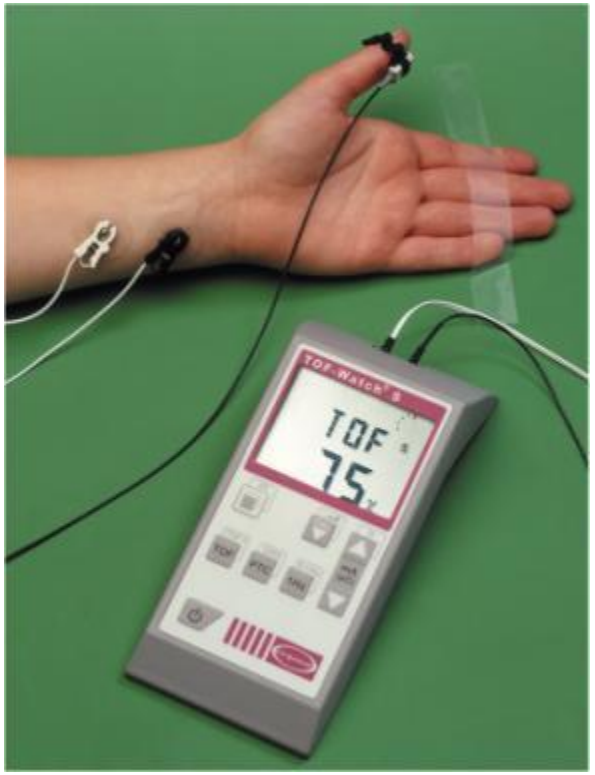
- **Olabildiğince rejyonel yöntemler**
- **Postoperatif solunumsal komplikasyon ve bulber işlevin derlenmesi**
- **Minimal invazif yöntemler**
- **Etkin/ yeterli analjezi**

İYİ HAZIRLANMIŞ MİYASTENİ HASTASI!!!

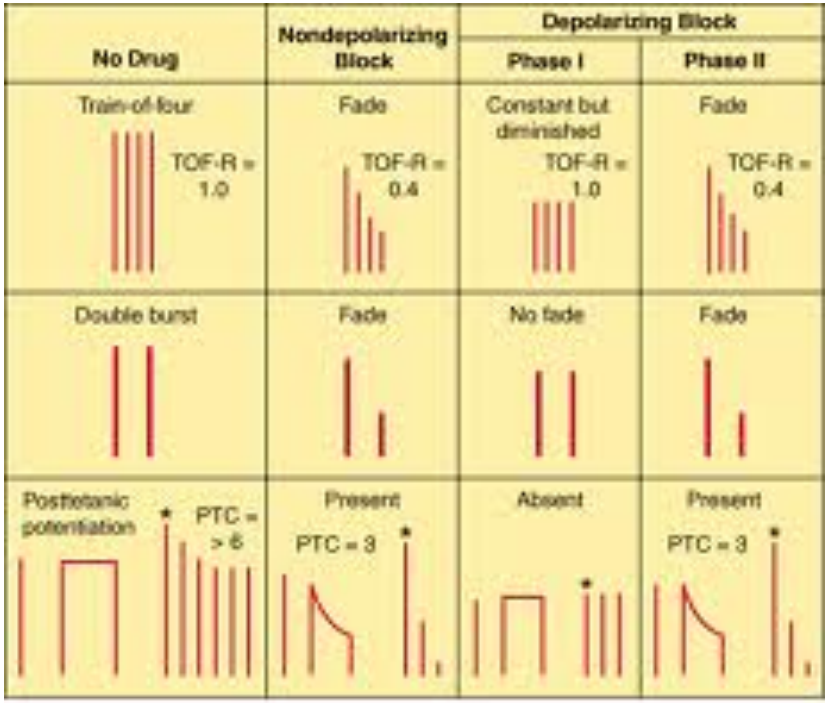
Anestezi yönetimi

Mültidisipliner Yaklaşım

Monitorizasyon



Monitorizasyon



Volatil anestetikler

- **VAler kas-sinir iletisini yavaşlatır**

Pre ve post-sinaptik etki

- **Miyastenide kas gevşetici gereksinimini ↓**

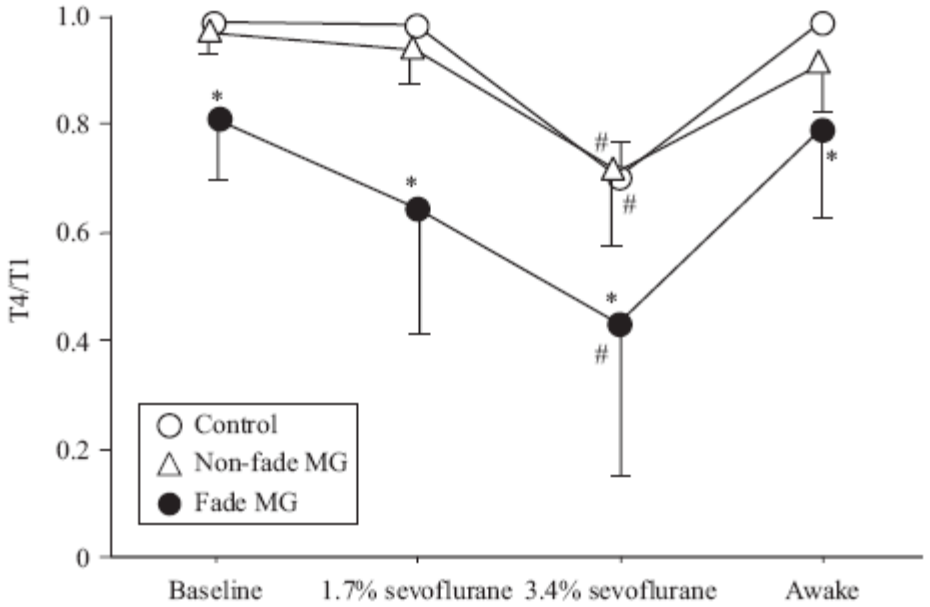
British Journal of Anaesthesia **98** (3): 337–41 (2007)
doi:10.1093/bja/ael368 Advance Access publication January 24, 2007

BJA

Neuromuscular effects of sevoflurane in myasthenia gravis patients

K. Nitahara*, Y. Sugi, K. Higa, S. Shono and T. Hamada

- **Sevofluran doza bağımlı T4/T1 baskılar; %3.4 konsantrasyon**
- **T4/T1 baskılanması ilk T4/T1 değeri ile orantılı**



Propofol or sevoflurane anesthesia without muscle relaxants allow the early extubation of myasthenic patients

[L'anesthésie au propofol ou au sévoflurane, sans myorelaxants, permet une extubation précoce chez des patients myasthéniques]

Giorgio Della Rocca MD,* Cecilia Coccia MD,* Laura Diana MD,† Livia Pompei MD,* Maria G. Costa MD,* Eleonora Tomaselli MD,† Pierangelo Di Marco MD,† Vincenzo Vilardi MD,* Paolo Pietropaoli MD†

	Propofol (n = 36)	*Sevoflurane (n = 32)*
Gender: M/F	14/22	12/20
Age (SD) (yr)	40 (14)	44 (18)
Body surface area (SD) (m^2)	1.83 (0.35)	1.78 (0.25)
Oserman's staging		
I	6	4
IIa/IIb	10/15	12/14
III	5	2
Preoperative treatment		
-Pyridostigmine (#pts)	36	32
- mg·day^{-1} (SD)	240 (60)	240 (60)
-Prednisone (#pts)	21	16
-Plasmapheresis (#pts)	7	4
Fev 1 (% of predicted value) [range]	80 [68-90]	82 [71-93]

TABLE II Duration of surgery and anesthesia, time to extubation and to awakening, postoperative blood gas values, postoperative complications

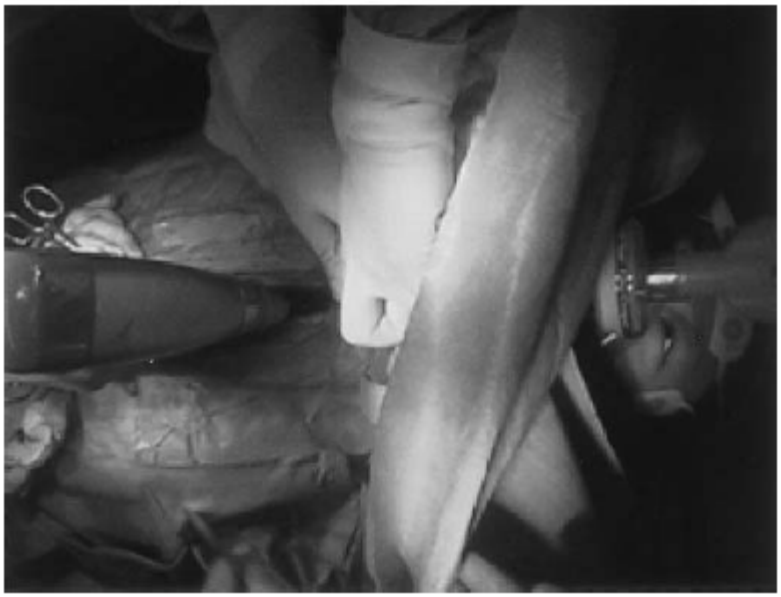
	Propofol	*(Grade of MG)*	*Sevoflurane*	*(Grade of MG)*
Duration of surgery [range] (min)	120 [70-205]		125 [70-200]	
Duration of anesthesia [range] (min)	148 [85-250]		165 [120-210]	
Δ extubation [range] (min)	15 [10-18]		12 [7-14]	
Δ awake [range] (min)	20 [11-29]		16 [8-27]	
Blood gas values two hours after surgery				
PaO_2 (SD) (mmHg)	83 (16)		105 (38)	
$PaCO_2$ (SD) (mmHg)	39 (6)		41 (5)	
FiO_2	0.4		0.4	
Postoperative complications				
Bleeding	2	(IIb)	0	
Respiratory insufficiency	0		2§	(IIb)
Infections	1	1		
Postoperative ICU LOS hr	24	24		
Postoperative H LOS [range] Days	8 [5-22]	7 [4-14]		

World J. Surg. 28, 962–966, 2004
DOI: 10.1007/s00268-004-7480-7

WORLD
Journal of
SURGERY

Extended Thymectomy in Patients with Myasthenia Gravis with High Thoracic Epidural Anesthesia Alone

Yoshio Tsunezuka, M.D., Ph.D., Makoto Oda, M.D., Ph.D., Isao Matsumoto, M.D., Ph.D.,
Masaya Tamura, M.D., Ph.D., Go Watanabe, M.D., Ph.D.



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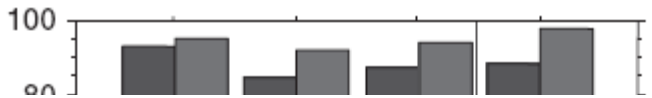
ACTA ANAESTHESIOLOGICA SCANDINAVICA
doi: 10.1111/j.1399-6576.2008.01853.x

The use of desflurane or propofol in combination with remifentanil in myasthenic patients undergoing a video assisted thoracoscopic-extended thymectomy

P. Gritti[1], B. Carrara[2], M. Khotcholava[2], G. Bortolotti[1], D. Giardini[2], L. A. Lanterna[1], A. Benigni[2] and V. Sonzogni[2]



	TCI propofol–remifentanil No. of patients = 19	Desflurane–remifentanil No. of patients = 17	*P*-value
Gender	12 female (63%) 7 male (27%)	14 female (82%) 3 male (18%)	0.27
Age	38 years mean, range 18–62 year, SD 11.4	32.5 year median, range 15–68 year, SD 13.2	0.41
Body weight	69.3 kg mean, range 45–112 kg, SD 16.43	60.09 kg median, range 47–76 kg, SD 9.92	0.07
Height	167.2 cm mean, range 153–186 cm, SD 9.2	163.9 cm mean, range 152–175 cm, SD 7.52	0.28
Body surface area	1.78 m^2 mean, range 1.44–2.13 m^2, SD 0.22	1.64 m^2 mean, range 1.43–1.91 m^2, SD 0.154	0.07
Disease duration	21 months mean, range 5–54 months, SD 14.4	29 months mean, range 6–60 months, SD 12.2	0.2
MGFA			
I	1 patient	5 patients	0.11
II A	7 patients	4 patients	
II B	10 patients	5 patients	
III	1 patient	3 patients	
Pre-operative treatment			
Pyridostigmine	17 patients, 181 mg mean, range 0–420 mg, SD 104	17 patients, 232 mg mean, range 60–450 mg, SD 103	0.27
Prednisone	13 patients	11 patients	
Plasmapheresis.	2 patients	3 patients	
Immunoglobulin	0 patients	3 patients	
Azathioprine	4 patients	1 patient	

Desflurane group
Propofol group

SD, standard deviation; MGFA, Myasthenia Gravis Foundation of America; TCI, target controlled infusion.

		Desflurane *n* = 17	*P*-value
		138 min (70–285) SD 52	0.75
		165 min (112–310) SD 52	0.98
ntraoperative infusion fluids (crystalloids)	2007 ml (500–4000) SD 671	1960.5 ml (1500–3000) SD 515	2062.5 (500–4000) SD 834	0.66
t awake	14 min (5–30) SD 6	17 min (6–30) SD 7	11.9 min (5–20) SD 3.7	0.03
t extubation	14 min (2–36) SD 6	15 min (2–36) SD 7	12.4 min (5–20) SD 4.4	0.3

doi:10.1510/icvts.2009.214635

INTERACTIVE CARDIOVASCULAR AND THORACIC SURGERY

Interactive CardioVascular and Thoracic Surgery 9 (2009) 995-998

www.icvts.org

Institutional report - Thoracic non-oncologic

Early outcomes of video-assisted thoracoscopic resection of thymus in 181 patients with myasthenia gravis: who are the candidates for the next morning discharge?

Alper Toker[a,*], Serhan Tanju[a], Sedat Ziyade[a], Berker Özkan[a], Zerrin Sungur[b], Yesim Parman[c], Piraye Serdaroglu[c], Feza Deymeer[c]

Univariate analysis according to NMD and late discharge

Variables	Mean
Age (years)	29.8
Duration of symptoms (months)	22.5
Duration of operation (min)	51.3
Postoperative stay (days)	2.1
Visual analogue scale	2.12
Mean modified Osserman Genkins stage	2.5±0.89
Mean amount of pyridostigmine bromide mg/day	209.1 mg±107
Mean amount of corticosteroids mg/day	14.4 mg±19.0
Intensive care unit stay (h)	18.6 (4 patients)
Intravenous immunoglobulin administration	32 patients (17.6%)

NMD	61	16.8	21.1	
Late	120	13.2	17.8	0.2

4 hasta YB

61 hasta ertesi gün taburcu

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ISSN 0001-5172

Case Report

Rocuronium in two myasthenic patients undergoing thymectomy

M. SANFILIPPO, G. FIERRO, M. V. CAVALLETTI, F. BIANCARI[1] and V. VILARDI[2]

0.15mg/kg roküronyum (0.5ED95) ➥ 37dakikalık blok

- **0.01mg/kg vekuronyum (0.2ED95)**
- **n=14 hasta**
- **ameliyathanede ekstübasyon**

Tripathi, J Postgrad Med 2003

Mivacurium in patients with myasthenia gravis undergoing video-assisted thoracoscopic thymectomy

Editor—Video-assisted thoracoscopic thymectomy

Z. Sungur Ulke*
M. Senturk
Istanbul, Turkey

Table 1 Demographic, preoperative and operative data of 112 patients. Data are mean (range) or mean (SD)

Age (yr)	33.3 (18–55)
BMI	24.1 (13.2)
Operation time (min)	64.2 (27.2)
Osserman I–II/III–IV	100/12
Leventhal $<11/\geq 11$	91/21
Pyridostigmine dose (mg)	229.89 (110.5)
Initial mivacurium dose (mg)	7 (0.9)
Intubation time (s)	151 (68)

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doi: 10.1111/aas.12123

Rocuronium and sugammadex in patients with myasthenia gravis undergoing thymectomy

Z. SUNGUR ULKE[1], A. YAVRU[1], E. CAMCI[1], B. OZKAN[2], A. TOKER[2] and M. SENTURK[1]
Departments of [1]Anaesthesiology and [2]Thoracic Surgery, Istanbul University Istanbul Medical Faculty, Istanbul, Turkey

Pre-operative data of ten patients.

Age (year)	31 ± 12
Weight (kg)	68 ± 13
Osserman I–II/III–IV	7/3
Pyridostigmine dose (mg/day)	210 ± 90

TOF value prior to sugammadex injection.

	TOF value (%)
Patient 1	50
Patient 2	0
Patient 3	35
Patient 4	30
Patient 5	25
Patient 6	45
Patient 7	10
Patient 8	40
Patient 9	45
Patient 10	50

	Block level	Sugammadex dose (mg/kg)	Recovery time* (s)
Petrun *et al.*[9]	Moderate	2	240
Unterbuchner *et al.*[10]	Moderate	4	210
Komasawa *et al.*[11]	Deep	2	30
Belval *et al.*[12]	Deep	4	180
De Boer *et al.*[13]	Deep	4	167
Garcia and Diemunsch[15]	Deep	4	240

Derlenme süresi 111sn [35; 240]

Postop bakım

1. Optimal ağrı kontrolü

- **rejyonel analjezi**
- **opioid titrasyonu**
- **multimodal protokol**

Postop bakım

2. Nörolojik değerlendirme

Ach esteraz vd tedaviler

3. Solunum fizyoterapisi

4. Erken mobilizasyon

Original article

Predictors of postoperative myasthenic crisis in patients with myasthenia gravis after thymectomy

CHU Xiang-yang, XUE Zhi-qiang, WANG Ru-wen and TAN Qun-you

- 243 MG, sternotomi
- 44 miyastenik kriz

Table 3. Multivariate analysis of 243 patients with postoperative myasthenic crisis by Logistic regression

Variables	Relative risk	95% confidence interval	*P* values
Osserman stage			
I+IIa vs. IIb+III+IV	0.0953	0.0311–0.2924	<0.0001
History of myasthenic crisis			
With vs. without	0.3595	0.0677–1.9102	0.230
Preoperative pyridostigmine dose			
<240 mg vs. >240 mg	0.9519	0.3557–2.5475	0.922
Thymoma			
With vs. without	0.0294	0.0097–0.0890	<0.0001
Major postoperative complications			
With vs. without	0.0424	0.0095–0.1898	<0.0001

Bizim sonuçlarımız

- **325 MG hastası (239 ♀, 86 ♂)**

Yaş: 31.8 (11-75)

VKİ: 24.8±

- **296 olguda piridostigmin**
- **158 olguda steroid**

- **Erken postoperatif dönemde 19 (%5.8) hasta yoğun bakımda**
- **9 yoğun bakım (ortalama yapay solunum 12 saat)**

4 olgu Osserman ≥3

2 olgu ↑Ach esteraz tedavi

2 olgu yandaş akciğer hastalığı

1 yoğun bakımda iken

- **Ortalama hastanede kalış süresi 2.26 ± 1.26 gün**
- **Komplikasyon oranı %5.**
  - **10 atelektazi**
  - **3 hemoraji**
  - **2 reentübasyon gerektirecek myastenik kriz**
  - **1 nazokomiyal pnömoni**

SONUÇ

- **Perioperatif süreçte mültidisipliner yaklaşım esastır.**
- **İyi preoperatif hazırlık, uygun bir anestezi planı ve minimal invazif cerrahi tekniklerle MGli hastalar hızlı ve güvenle cerrahi süreci atlatabilirler.**
- **NM monitorizasyonla kas gevşeticiler de düşük dozlarda miyastenik hastalarda kullanılabilir.**