Noninvazif Mekanik Ventilasyon

Kime? Ne zaman?

Dr.Y.Kemal GÜNAYDIN

Ankara Eğitim ve Araştırma Hastanesi Acil Tıp Kliniği

Sunum Planı

- Tanım
- Tarihçe
- Kullanım yerleri
- Hasta seçimi
- Uygulama
- NIMV tipleri
- Kontrendikasyonlar
- Komplikasyonlar
- Başarı
- Kime? Ne zaman?

Tanım

- NIMV endotrakeal entübasyon uygulanmadan ventilasyon desteğinin sağlanmasıdır.
- Nazal ya da yüz maskesi kullanılarak pozitif basıncın uygulandığı noninvazif bir tekniktir.

Tarihçe

- İlk olarak 20.yy başlarında negatif basınçlı ventilatörler ile uygulanmış.
- 1960'larda bir ağızlık aracılığıyla nöromuskuler hastalıklarda denenmiş.
- 1980'lerde OSAS ve nöromuskuler hastalıklarda nokturnal CPAP etkili olmuş.
- Sonrasında KOAH, AC ödemi ve Akut Solunum Yetmezliğinde etkili olmuş.
- Günümüzde oldukça yaygın kullanılmakta

NIMV ile IMV arasındaki farklar

	NIMV	IMV
1-Mekanik ventilasyon desteğinin hastaya ulaştırılması	-maske ile	- entübasyon tüpü ile
2-Uygulama yeri	-acil, servis,YBÜ ara yoğun bakım, ev	- YBÜ
3-Sedasyon gereksinmesi	-nadir	-sıklıkla vardır
4-Sekresyonlar	-hasta kendi çıkarır	-aspire edilmelidir
5-Beslenme	-kendi beslenir	-beslenmesi gerekir
6-Çevre ile iletişim	-konuşabilir	-kötü
7-pnömoni komplikasyonu	-az (<%5)	-yüksek

Kullanım yerleri

- Yoğun bakımlar
- Kritik bakım üniteleri
- ***Acil servisler***
- Özellikle göğüs hastalıkları servisleri
- Ev tipi NIMV

Hasta Seçimi

- NIMV'un başarısı için uygun hasta seçimi çok önemlidir.
- Solunum yetmezliği semptom ve bulguları var mı?
- Arter kan gazı nasıl?
- Entübasyon endikasyonu var mı?

Hasta Seçimi

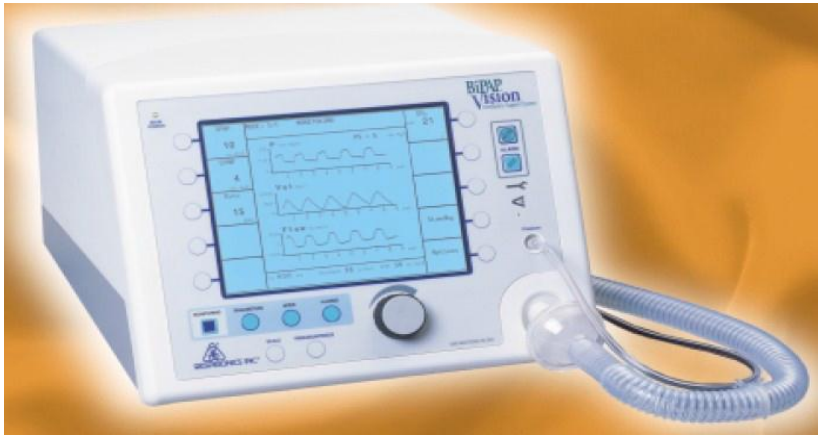
- ***Potansiyel geri dönüşümlü*** solunum yetmezliği
- Takipne (25/dk < SS < 35/dk)
- Aksesuar solunum kaslarının kullanımı
- Paradoksal solunum
- Arter kan gazında
    - 7,20 < pH < 7,35
    - 45 mmHg < $PaCO_2$ < 60 mmHg
    - 60 mmHg < PaO_2 < 80 mmHg
    - 100 < PaO_2 / FiO_2 < 200

Uygulama

- Maske ya da nazal kanül

Uygulama

- Çeşitli NIMV cihazları vardır.



Uygulama

- Hasta güvenlik çemberine alınır
- Gövde ez az 30 derece yükseltilmeli
- Uygun maske – Kaçak kontrol
- İnvazif ventilatör cihazı
    - İP / PSV: 8-12 cmH2O
    - PEEP: 3-5 cmH2O
- NİMV cihazı
    - İPAP: 8-12 cmH2O
    - EPAP: 3-5 cmH2O
- FiO2 SaO2 > 90 olacak şekilde ayarlanır

NIMV modları

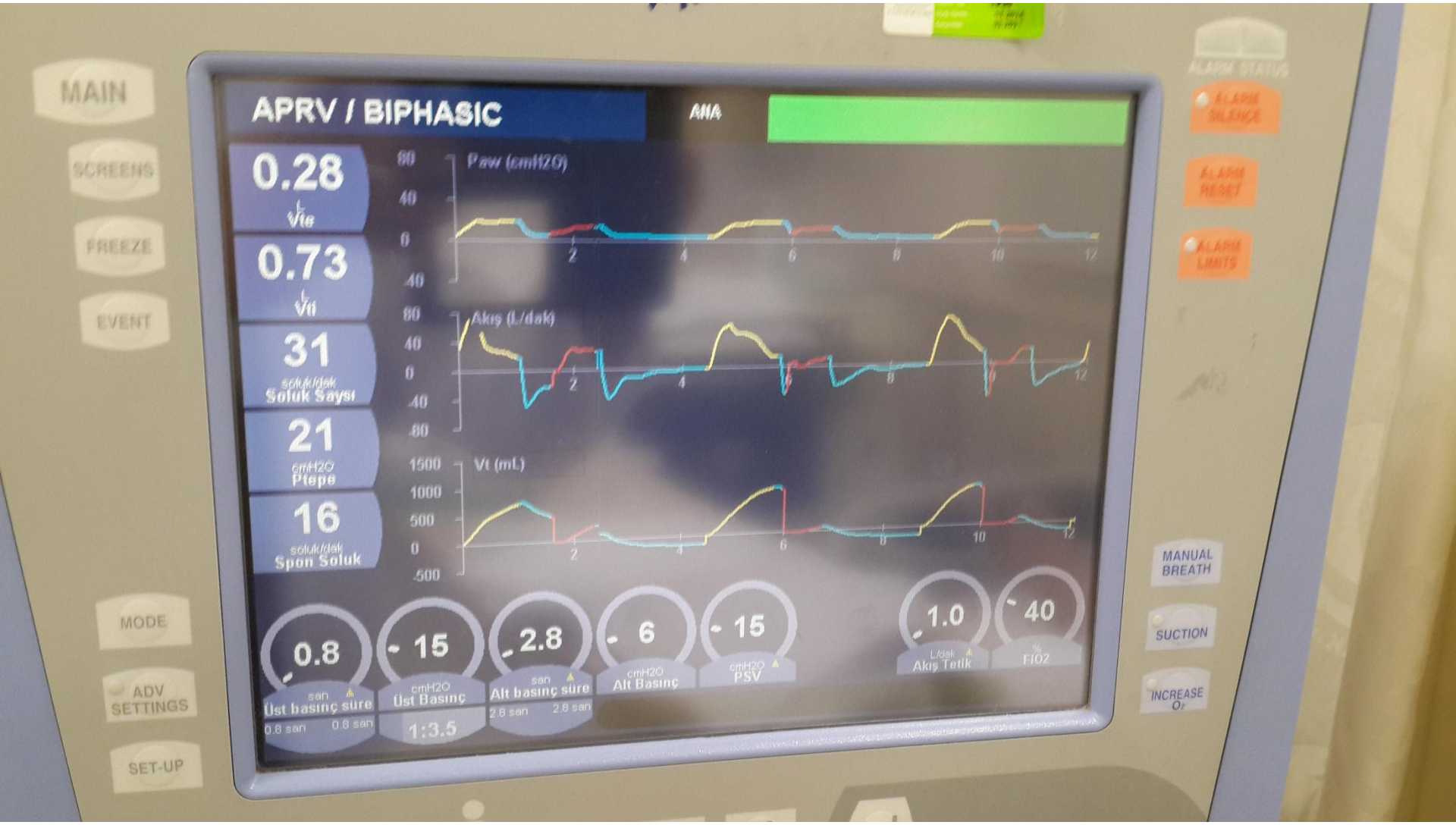
- CPAP (Continuous positive airway pressure)
  - PEEP / EPAP
- BPAP (Bilevel positive airway pressure)
  - İP/PSV ya da İPAP + PEEP
- HFNC (High flow nasal cannula)
  - Özel nazal kanül + nemlendirici sistem
  - Geleneksel nazal kanüle göre %25-35 oranında daha fazla O2 desteği

NIMV tipleri

- CPAP – Hipoksik solunum yetmezliği
- BPAP – Hipoksik solunum yetmezliği
  – Hiperkapnik solunum yetmezliği
- HFNC (High flow nasal cannula)
  – Hipoksik solunum yetmezliği
  – Hiperkapnik solunum yetmezliği

- *Frat JP, Thille AW, Mercat A, et al. High-flow oxygen through nasal cannula in acute hypoxemic respiratory failure. N Engl J Med 2015;372(23):2185–96.*
- *Ward JJ. High-flow oxygen administration by nasal cannula for adult and perinatal patients. Respir Care 2013;58:98–122.*


CPAP / PSV
AHA
0.69
Vti
0.66
Vte
12
soluk/dak
Soluk Sayısı
22
cmH2O
Ptepe
12
soluk/dak
Spon Soluk
Paw (cmH2O)
Akış (L/dak)
Vt (mL)
- 14
cmH2O
PSV
- 8
cmH2O
PEEP
- 1.5
L/dak
Akış Tetik
- 30
%
FiO2
MAIN
SCREENS
FREEZE
EVENT
MODE
ADV SETTINGS
SET-UP
ALARM STATUS
ALARM SILENCE
ALARM RESET
ALARM LIMITS
MANUAL BREATH
SUCTION
INCREASE O2


APRV / BIPHASIC
AHA
MAIN
SCREENS
FREEZE
EVENT
MODE
ADV SETTINGS
SET-UP
ALARM STATUS
ALARM SILENCE
ALARM RESET
ALARM LIMITS
MANUAL BREATH
SUCTION
INCREASE O2
0.28
Vte
0.73
Vti
31
soluk/dak
Soluk Sayısı
21
cmH2O
Ptepe
16
soluk/dak
Spon Soluk
Paw (cmH2O)
Akış (L/dak)
Vt (mL)
0.8
san
Üst basınç süre
0.8 san
0.8 san
- 15
cmH2O
Üst Basınç
1:3.5
- 2.8
san
Alt basınç süre
2.8 san
2.8 san
- 6
cmH2O
Alt Basınç
- 15
cmH2O
PSV
1.0
L/dak
Akış Tetik
40
%
FiO2

Kontrendikasyonlar

- Solunumsal ya da kardiyak arrest
- Medikal instabilite
    - Hipotansif şok
    - AMI, AKS ya da ciddi aritmiler
- Hava yolunun korunamadığı durumlar
- Pnömotoraks
- Yüz cerrahisi, travma, deformite
- Yakın zamanda üst hava yolu ya da özefagus cerrahisi
- Aşırı sekresyon
- Koopere olamayan hasta

Komplikasyonlar

- **Majör**
  - Aspirasyon pnömonisi (< %5)
  - Hipotansiyon (< %5)
  - Barotravma (< %5)

- **Maske ile ilgili**
  - Rahatsızlık hissi (%30 - %50)
  - Yüzde eritem, ülserasyon, akne benzeri döküntü (%20 - %30)

- **Hava akımı ve basınçla ilgili (%10 - %20)**
  - Nazal konjesyon
  - Ağız kuruluğu
  - Kulak ve sinüs ağrısı
  - Göz iritasyonu

Başarı

- 1 ya da 2 saatlik NIMV uygulamasının ardından

  - Solunum sayısında azalma
  - Oksijenizasyonda düzelme (SaO_2 artışı)
  - Kan gazında pH ve $PaCO_2$ de düzelme

Kime? Ne zaman?

- Güçlü kanıtlar
  - KOAH alevlenme
  - Akut kardiyojenik akciğer ödemi
  - İmmünsüpresif hastalar
  - Weaning
- Orta düzeyde kanıtlar
  - Astım
  - Postoperatif solunum yetmezliği
  - Nöromuskuler hastalıklar
- Zayıf kanıtlar
  - ARDS
  - Pnömoni
  - Travma

KOAH alevlenme

CMAJ REVIEW

Clinical practice guidelines for the use of noninvasive positive-pressure ventilation and noninvasive continuous positive airway pressure in the acute care setting

Sean P. Keenan MD MSc, Tasnim Sinuff MD PhD, Karen E.A. Burns MD MSc, John Muscedere MD, Jim Kutsogiannis MD, Sangeeta Mehta MD, Deborah J. Cook MD MSc, Najib Ayas MD, Neill K.J. Adhikari MD CM MSc, Lori Hand BSc RRT, Damon C. Scales MD PhD, Rose Pagnotta RRT, Lynda Lazosky RRT, Graeme Rocker MD, Sandra Dial MD, Kevin Laupland MD MSc, Kevin Sanders MD

- KOAH alevlenme epizodlarında şayet hiperkapni varsa ya da pH < 7,35 ise NIMV yapılmalıdır. (***Grade 1A öneri***)
- CPAP için yapılmış yüksek kalitede çalışma olmağı için BPAP önerilmektedir.
- NIMV geciktirilmemelidir.

- Continuous positive airway pressure delivered by mask appears to be just as effective as noninvasive positive-pressure ventilation for patients with cardiogenic pulmonary edema.
- Patients with acute respiratory distress or hypoxemia, either in the postoperative setting or in the presence of immunosuppression, can be considered for a trial of noninvasive positive-pressure ventilation.
- Patients with COPD can be considered for a trial of early extubation to noninvasive positive-pressure ventilation in centres with extensive experience in the use of noninvasive positive-pressure ventilation.

ORIGINAL RESEARCH

Hospital Patterns of Mechanical Ventilation for Patients with Exacerbations of COPD

Peter K. Lindenauer[1,2,3,4], Mihaela S. Stefan[1,2,3,4], Meng-Shiou Shieh[1], Penelope S. Pekow[1,5], Michael B. Rothberg[6], and Nicholas S. Hill[7]

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DOI: 10.1513/AnnalsATS.201407-293OC
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Abstract

Rationale: Randomized trials have shown that noninvasive

Smaller hospitals and those located in rural areas had higher RS-NIV%. When stratified into quartiles on the basis of the RS-NIV%, hospitals in the highest quartile had lower risk-

- KOAH hastalarında NIMV uygulanması entübasyon ve İMV ihtiyacını azaltır.
- Ayrıca mortalite oranlarında önemli düşüş sağlar.

and to analyze the relationship between use of NIV and other outcomes.

Methods: Cross-sectional analysis of 77,576 patients hospitalized for COPD between June 2009 and June 2011 at 386 U.S. hospitals.

Measurements and Main Results: Using hierarchical modeling, we estimated hospital risk-standardized percentages of ventilator starts that were noninvasive (RS-NIV%). We examined the association between RS-NIV% and other outcomes, including risk-standardized rates of invasive ventilation and NIV failure, total ventilation, in-hospital mortality, length of stay, and costs. At the hospital level, the median RS-NIV% was 75.1% (range: 9.2–94.1%).

with hospitals with the lowest RS-NIV%. Higher RS-NIV% was associated with lower hospital costs (Q4 vs. Q1: $11,148 vs. $14,032, $P < 0.001$), shorter length of stay (Q4 vs. Q1: 5.5 vs. 6.8 d, $P < 0.001$), and lower NIV failure rates (Q4 vs. Q1: 12.8 vs. 32.5%, $P < 0.001$).

Conclusions: Use of NIV as the initial ventilation strategy for patients with COPD varies considerably across hospitals. Institutions with greater use of NIV have lower rates of invasive mechanical ventilation and better patient outcomes.

Keywords: COPD; costs and cost analysis; cross-sectional analysis; length of stay; outcomes research

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KLİNİK ÇALIŞMA
RESEARCH ARTICLE

The risk factors for late failure of non-invasive mechanical ventilation in acute hypercapnic respiratory failure

APACHE 2 skoru ve CRP düzeyi yüksek olan ve albumin, GKS düşüklüğü olan hastalar ile Pnömoni, Bronşiektazi varlığı olan hastalarda NIMV'un geç dönemde başarısız olma ihtimali yüksektir.

Aydın ÇİLEDAĞ[1]
Akın KAYA[1]
Özlem ERÇEN DİKEN[1]
Zeynep Pınar ÖNEN[1]
Elif ŞEN[1]
Nalan DEMİR[1]

SUMMARY

The risk factors for late failure of non-invasive mechanical ventilation in acute hypercapnic respiratory failure

Introduction: *Non-invasive mechanical ventilation provides early improvement in most of the patients with acute hypercapnic respiratory failure. The aim of our study was to determine the risk factors for late failure of non-invasive mechanical ventilation in patients with acute hypercapnic respiratory failure.*

Materials and Methods: *Ninety three patients were prospectively evaluated. Non-invasive mechanical ventilation was accepted to be successful if the patient was discharged from the hospital without the need for intubation (group 1) and to be late failure if a deterioration occurred after an initial improvement of blood gases tension and general conditions (group 2).*

Results: *Non-invasive mechanical ventilation was successful in 62 (66.7%) patients. In 25 (26.9%) patients a late failure was observed. There was no difference between groups 1 and 2 in terms of pretreatment pH, $PaCO_2$ and PaO_2/FiO_2. However, serum C-reactive protein level, Acute Physiology and Chronic Health Evaluation II (APACHE II) score and frequency of bronchiectasis and pneumonia were significantly higher and serum albumin level, Glasgow Coma Score, cough strength and compliance to non-invasive mechanical ventilation were significantly lower in group 2.*

Conclusion: *The pretreatment high APACHE II Score and C-reactive protein level, low Glasgow Coma Score, albumin level, cough strength, bad compliance to non-invasive mechanical ventilation, the presence of bronchiectasis and pneumonia and absence of significance improvement in PaO_2/FiO_2 after treatment were determined as risk factors for non-invasive mechanical ventilation late failure.*

Yazışma Adresi (Address for Correspondence)

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journal homepage: www.elsevier.com/locate/rmed

Volume assured versus pressure preset non-invasive ventilation for compensated ventilatory failure in COPD

KOAH hastalarında basınç kontrollü NIMV ile volüm kontrollü NIMV arasında hastanın uyumu açısından herhangi bir fark yoktur.

MESH KEYWORDS
Chronic obstructive pulmonary disease;
Non-invasive ventilation;
Chronic ventilatory failure

Summary
Background: The addition of domiciliary non-invasive ventilation (NIV) to standard therapy in chronic obstructive pulmonary disease (COPD) patients with compensated ventilatory failure (CVF) is reported to have beneficial effects. Compliance with NIV is an important factor. Volume assured NIV (va-NIV) may improve compliance and ventilation during sleep by automatically titrating ventilatory pressures.
Methods: A prospective single centre, randomised, parallel group trial comparing va-NIV and pressure preset NIV (pp-NIV) in COPD patients with CVF naïve to domiciliary NIV was performed (ISCRTN91892415). The primary outcomes were arterial blood gases, mean overnight oximetry ($mSpO_2$) and compliance after three months. Secondary outcomes included pulmonary function, exercise capacity and health-related quality of life assessment.
Results: Forty patients were randomised in a 1:1 ratio. The va-NIV median target minute ventilation was 8.4 L/min and pp-NIV median inspiratory pressure was 28 cmH_2O. There were no significant differences between groups in primary or secondary outcomes after three months. Mean (SD) PaO_2 8.7 (1.7) versus 7.9 (1.7) kPa ($p = 0.19$), $PaCO_2$ 6.7 (0.5) versus 7.3 (1.1) kPa ($p = 0.1$), $mSpO_2$ 89.7 (4.2) versus 89.8 (3.9) % ($p = 0.95$), compliance 5.0 (3.1) versus 4.7 (3.2) hours ($p = 0.8$) in va-NIV versus pp-NIV respectively. Patients allocated va-NIV spent fewer days in hospital initiating therapy 3.3 (1.6) versus 5.2 (2.8) ($p = 0.02$). Both groups showed significant improvements in $PaCO_2$ and $mSpO_2$ after three months treatment.
Conclusions: Domiciliary va-NIV and pp-NIV have similar effects on physiological outcomes in COPD patients with CVF and both are well tolerated.
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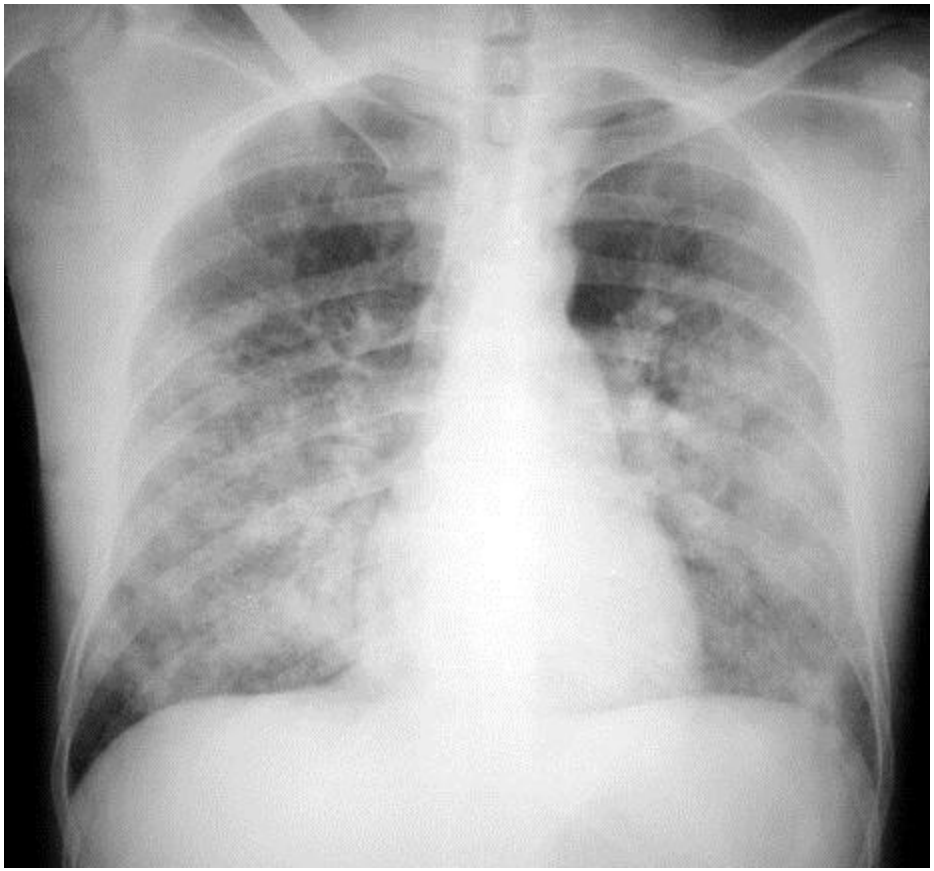
Akut akciğer ödemi



Non-invasive positive pressure ventilation (CPAP or bilevel NPPV) for cardiogenic pulmonary oedema (Review)

Vital FMR, Ladeira MT, Atallah ÁN

Vital FMR, Ladeira MT, Atallah ÁN.
Non-invasive positive pressure ventilation (CPAP or bilevel NPPV) for cardiogenic pulmonary oedema.
Cochrane Database of Systematic Reviews 2013, Issue 5. Art. No.: CD005351

- AC ödemi hastalarında NIMV kullanımı entübasyon ve mortalite oranlarını azaltmaktadır.
- Olabildiğince erken dönemde başlanmalıdır.

We included 32 studies (2916 participants), of generally low or uncertain risk of bias. Compared with standard medical care, NPPV significantly reduced hospital mortality (RR 0.66, 95% CI 0.48 to 0.89) and endotracheal intubation (RR 0.52, 95% CI 0.36 to 0.75). We found no difference in hospital length of stay with NPPV; however, intensive care unit stay was reduced by 1 day (WMD -0.89 days, 95% CI -1.33 to -0.45). Compared with standard medical care, we did not observe significant increases in the incidence of acute myocardial infarction with NPPV during its application (RR 1.24, 95% CI 0.79 to 1.95) or after (RR 0.70, 95% CI 0.11 to 4.26). We identified fewer adverse events with NPPV use (in particular progressive respiratory distress and neurological failure (coma)) when compared with standard medical care.

Authors' conclusions

NPPV in addition to standard medical care is an effective and safe intervention for the treatment of adult patients with acute cardiogenic pulmonary oedema. The evidence to date on the potential benefit of NPPV in reducing mortality is entirely derived from small-trials and further large-scale trials are needed.

Journal of Cardiac Failure Vol. 17 No. 10 2011

Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema: A Meta-Analysis of Randomized Controlled Trials

JAVIER MARIANI, MD,[1] ALEJANDRO MACCHIA, MD,[1] CÉSAR BELZITI, MD,[2] MAXIMILIANO DEABREU, MD,[1] JUAN GAGLIARDI, MD,[1] HERNÁN DOVAL, MD,[1] GIANNI TOGNONI, MD,[3] AND CARLOS TAJER, MD[1]

- NIMV ve CPAP hastane içi ve yoğun bakım mortalite oranlarını %20,
- endotrakeal entübasyon ihtiyacını %57 oranda azaltır.
- AMI riskini arttırmaz.
- Akut akciğer ödemi tedavisinde uygun hastalarda geciktirilmeden başlanmalıdır.

Results: At total of 34 studies (3,041 patients) were included. In direct comparisons, both CPAP and NIPPV reduced the risk of death (relative risk [RR] 0.64, 95% CI 0.44–0.93; RR 0.80, 95% CI 0.58–1.10; respectively) compared with ST, although only CPAP had a significant effect. There were no significant differences between NIPPV and CPAP. Pooled results of direct and adjusted indirect comparisons showed that compared with ST, both CPAP and NIPPV significantly reduced mortality (RR 0.63, 95% CI 0.44–0.89; RR 0.73, 95% CI 0.55–0.97; respectively).

Conclusions: Our findings suggest that among ACPE patients, NIV delivered through either NIPPV or CPAP reduced mortality. (*J Cardiac Fail 2011;17:850–859*)

Key Words: Continuous positive airway pressure, noninvasive positive pressure ventilation, pulmonary edema, acute heart failure.

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Brief Reports

RANDOMIZED TRIAL OF BILEVEL VERSUS CONTINUOUS POSITIVE AIRWAY PRESSURE FOR ACUTE PULMONARY EDEMA

Timothy Liesching, MD,* David L. Nelson, RRT,† Karen L. Cormier, RRT,† Andrew Sucov, MD,‡ Kathy Short, RN, RRT,§ Rod Warburton, BA,|| and Nicholas S. Hill, MD||

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Reprint Address: Nicholas S. Hill, MD, Division of Pulmonary, Critical Care and Sleep Medicine, Tufts Medical Center, 800 Washington St #257,

- BPAP'ın, CPAP'a göre oksijenizasyonu daha iyi sağladığı ve yoğun bakım ihtiyacının daha az olduğu tespit edilmiş.
- Ancak entübasyon ve mortalite ve AMI riski oranları benzer bulunmuş.

Vital signs and dyspnea scores were recorded at baseline, 30 min, 1 h, and 3 h. Blood gases were obtained at baseline, 30 min, and 1 h. Patients were monitored for MI, endotracheal intubation (ETI), lengths of stay (LOS), and hospital mortality. Results: Fourteen patients received CPAP and 13 received BPAP. The two groups were similar at baseline (ejection fraction, dyspnea, vital signs, acidemia/oxygenation) and received similar medical treatment. At 30 min, PaO_2:FIO_2 was improved in the BPAP group compared to baseline (283 vs. 132, $p < 0.05$) and the CPAP group (283 vs. 189, $p < 0.05$). Thirty-minute dyspnea scores were lower in the BPAP group compared to the CPAP group ($p = 0.05$). Fewer BPAP patients required intensive care unit (ICU) admission (38% vs. 92%, $p < 0.05$). There were no differences between groups in MI or ETI rate, LOS, or mortality. Conclusions: Compared to CPAP to treat APE, BPAP more rapidly improves oxygenation and

Multiple randomized controlled studies and meta-analyses have demonstrated the efficacy of either continuous positive airway pressure (CPAP) or noninvasive positive pressure ventilation (NPPV) (i.e., the combination of positive end expiratory pressure and pressure support administered via a face mask) to treat acute cardiogenic pulmonary edema (APE) (1–18). When compared with standard oxygen and medical therapy, these modalities more rapidly improve dyspnea and gas exchange abnormalities, greatly reduce the need for intubation and, at least in the case of CPAP, mortality rates (1–4,6,8,10–15,18). Randomized studies and meta-analyses comparing NPPV and CPAP have shown no differences with regard to intubation or mortality rates, but some have shown more rapid improvements in dyspnea and gas exchange with NPPV (8,13,15,16,19–28).

Circulation Journal
Official Journal of the Japanese Circulation Society
http://www.j-circ.or.jp

ORIGINAL ARTICLE
Critical Care

Noninvasive Ventilation in Pulmonary Edema Complicating Acute Myocardial Infarction

Takeshi Yamamoto, MD; Shinhiro Takeda, MD; Naoki Sato, MD; Koichi Akutsu, MD; Hiroshi Mase, MD; Keiko Nakazato, MD; Kyoichi Mizuno, MD; Keiji Tanaka, MD

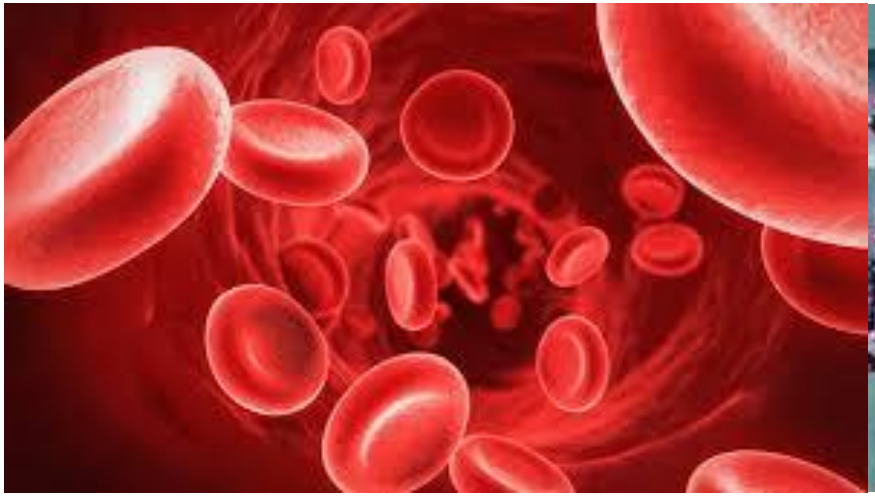
AMI sonrası gelişen akciğer ödeminde NIMV kullanımı hastaların prognozunu kötü yönde etkilememektedir. AMI sürecinde solunum yetmezliğinin şiddeti üzerinde olumsuz bir etkisi yoktur.

dotracheal intubation after weaning from NIV was higher in the AMI group than in the non-AMI group (7.5% vs. 0.7%, P=0.016), although the overall frequency of intubation was similar in both groups. The in-hospital mortality rate was similar in the AMI and non-AMI groups (13.1% vs. 9.8%, P=0.489).

Conclusions: NIV effectively improved vital signs and oxygenation and lowered the intubation rate in patients with cardiogenic pulmonary edema of all etiologies, including AMI. The outcome in patients with AMI treated with NIV depends primarily on the severity of the course of AMI and not on the severity of acute respiratory failure. (*Circ J* 2012; **76:** 2586–2591)

Key Words: Acute myocardial infarction; Noninvasive ventilation; Pulmonary edema

İmmünsüpresif hastalar



BMC Pulmonary Medicine

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Non-invasive mechanical ventilation and mortality in elderly immunocompromised patients hospitalized with pneumonia: a retrospective cohort study

Abstract

Background

Pnömoni tanısı ile hospitalize edilmiş immünkomprese hastalarda NIMV İMV'a kıyaslandığında 90 günlük mortalite oranları daha düşük tespit edilmiş.

Affairs administrative databases. We included veterans age ≥65 years who were immunocompromised and hospitalized due to pneumonia. Multilevel logistic regression analysis was used to determine the relationship between the use of invasive versus non-invasive mechanical ventilation and 30-day and 90-day mortality.

Results

Of 1,946 patients in our cohort, 717 received non-invasive mechanical ventilation and 1,229 received invasive mechanical ventilation. There was no significant association between all-cause 30-day mortality and non-invasive versus invasive mechanical ventilation in our adjusted model (odds ratio (OR) 0.85, 95% confidence interval (CI) 0.66-1.10). However, those patients who received non-invasive mechanical ventilation had decreased 90-day mortality (OR 0.66, 95% CI 0.52-0.84). Additionally, receipt of guideline-concordant antibiotics in our immunocompromised cohort was significantly associated with decreased odds of 30-day mortality (OR 0.31, 95% CI 0.24-0.39) and 90-day mortality (OR 0.41, 95% CI 0.31-0.53).

Conclusions

Our findings suggest that physicians should consider the use of non-invasive mechanical ventilation, when appropriate, for elderly immunocompromised patients hospitalized with pneumonia.

Non-invasive ventilation in patients with hematologic malignancy: a new prospective

V. SQUADRONE, G. FERREYRA, V. M. RANIERI

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- Hematolojik malingnitelere sekonder gelişen solunum yetmezliği tablosunda erken dönemde NIMV uygulanması mortalite oranlarında ciddi bir düşüş sağlamaktadır.
- Ancak NIMV ne zaman başlanacağı ve ne kadar bir süre uygulanacağı konusu net değildir.

to use NIV in immunosuppressed patients have been quite prudent. However, NIV has been recently applied in hematologic malignancy patients during an early or/and late respiratory failure, showing a favorable impact improving the outcome. At an early stage, one study showed CPAP to reduce respiratory complications and to improve the outcome of mortality rate from 75% in the control group to 15% in the treatment group, when compared to oxygen therapy. In other two randomized control trials, NIV in comparison to invasive mechanical ventilation demonstrated to reduce mortality rate from 100% to 53-61%. As most of the non-randomized control trials applied NIV in a general population of immunosuppressed patients, results are very difficult to analyze. So far, the treatment starting, and duration time are still not clearly defined. Novel clinical trials should be performed to elucidate the appropriate application of NIV in this population. *(Minerva Anestesiol 2015;81:1118-26)*

Key words: Noninvasive Ventilation - Hematologic neoplasms - Immunocompromised Host.

Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Noninvasive Ventilation vs Oxygen Therapy on Mortality Among Immunocompromised Patients With Acute Respiratory Failure

A Randomized Clinical Trial

JAMA. 2015;314(16):1711-1719. doi:10.1001/jama.2015.12402
Published online October 7, 2015.

Hipoksemik Akut Solunum Yetmezliği olan immünkomprese yoğun bakım hastalarında erken dönemde NIMV uygulanması ile geleneksel oksijen tedavisi uygulanması arasında 28 günlük mortalite oranları, yoğun bakımla ilişkili enfeksiyon gelişmesi, hastanede yatış süresi açısından anlamlı bir fark yoktur.

IMPORTANCE Noninvasive ventilation has been recommended to decrease mortality among immunocompromised patients with hypoxemic acute respiratory failure. However, its effectiveness for this indication remains unclear.

OBJECTIVE To determine whether early noninvasive ventilation improved survival in immunocompromised patients with nonhypercapnic acute hypoxemic respiratory failure.

DESIGN, SETTING, AND PARTICIPANTS Multicenter randomized trial conducted among 374 critically ill immunocompromised patients, of whom 317 (84.7%) were receiving treatment for hematologic malignancies or solid tumors, at 28 intensive care units (ICUs) in France and Belgium between August 12, 2013, and January 2, 2015.

INTERVENTIONS Patients were randomly assigned to early noninvasive ventilation (n = 191) or oxygen therapy alone (n = 183).

MAIN OUTCOMES AND MEASURES The primary outcome was day-28 mortality. Secondary outcomes were intubation, Sequential Organ Failure Assessment score on day 3, ICU-acquired infections, duration of mechanical ventilation, and ICU length of stay.

RESULTS At randomization, median oxygen flow was 9 L/min (interquartile range, 5-15) in the noninvasive ventilation group and 9 L/min (interquartile range, 6-15) in the oxygen group. All patients in the noninvasive ventilation group received the first noninvasive ventilation session immediately after randomization. On day 28 after randomization, 46 deaths (24.1%) had occurred in the noninvasive ventilation group vs 50 (27.3%) in the oxygen group (absolute difference, −3.2 [95% CI, −12.1 to 5.6]; $P = .47$). Oxygenation failure occurred in 155 patients overall (41.4%), 73 (38.2%) in the noninvasive ventilation group and 82 (44.8%) in the oxygen group (absolute difference, −6.6 [95% CI, −16.6 to 3.4]; $P = .20$). There were no significant differences in ICU-acquired infections, duration of mechanical ventilation, or lengths of ICU or hospital stays.

CONCLUSIONS AND RELEVANCE Among immunocompromised patients admitted to the ICU with hypoxemic acute respiratory failure, early noninvasive ventilation compared with oxygen therapy alone did not reduce 28-day mortality. However, study power was limited.

Perspective

Journal of Thoracic Disease, Vol 8, No 3 March 2016

Non-invasive ventilation in immunocompromised patients with acute hypoxemic respiratory failure

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Abstract: The survival rate of immunocompromised patients has improved over the past decades in light of remarkable progress in diagnostic and therapeutic options. Simultaneously, there has been an increase in the number of immunocompromised patients with life threatening complications requiring intensive care unit (ICU) treatment. ICU admission is necessary in up to 15% of patients with acute leukemia and 20% of bone marrow transplantation recipients, and the main reason for ICU referral in this patient population is acute hypoxemic respiratory failure, which is associated with a high mortality rate, particularly in patients requiring endotracheal intubation. The application of non-invasive ventilation (NIV), and thus the avoidance of endotracheal intubation and invasive mechanical ventilation with its side effects, appears therefore of great importance in this patient population. Early trials supported the benefits of NIV in these settings, and the 2011 Canadian guidelines for the use of NIV in critical care settings suggest the use of NIV in immune-compromised patients with a grade 2B recommendation. However, the very encouraging results from initial seminal trials were not confirmed in subsequent observational and randomized clinical studies, questioning the beneficial effect of NIV in immune-compromised patients. Based on these observations, a French group led by Azoulay decided to assess whether early intermittent respiratory support with NIV had a role in reducing the mortality rate of immune-compromised patients with non-hypercapnic hypoxemic respiratory failure developed in less than 72 h, and hence conducted a multicenter randomized controlled trial (RCT) in experienced ICUs in France. This perspective reviews the findings from their RCT in the context of the current critical care landscape, and in light of recent results from other trials focused on the early management of acute hypoxemic respiratory failure.

Keywords: Non-invasive ventilation (NIV); respiratory failure; immunosuppression

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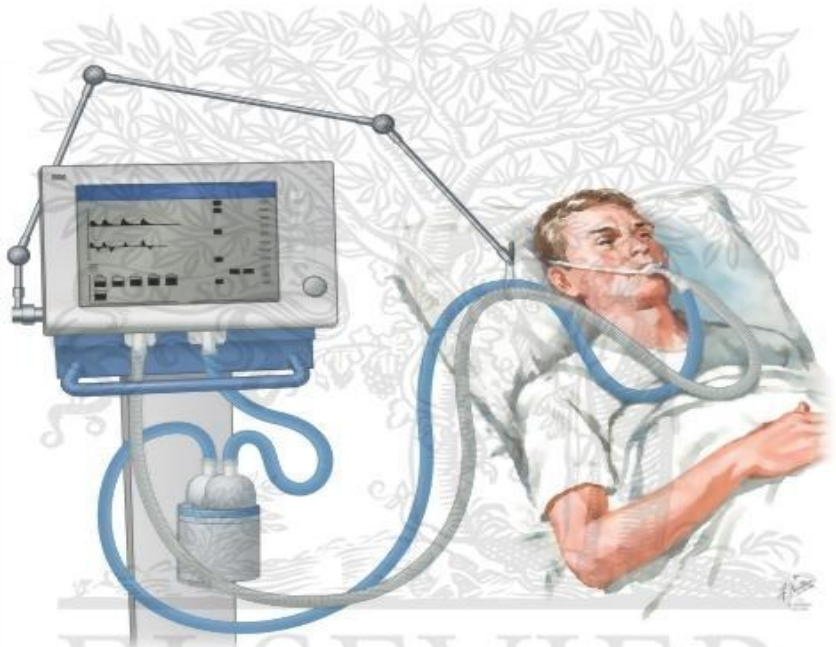
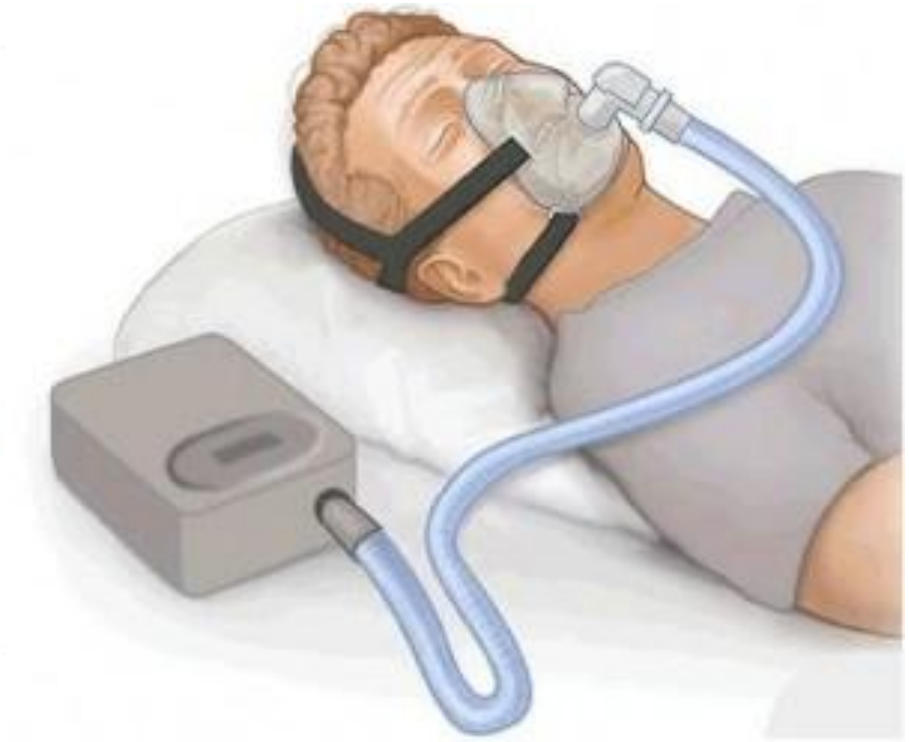
Weaning





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Heart & Lung

journal homepage: www.heartandlung.org

Efficacy of noninvasive ventilation after planned extubation: A systematic review and meta-analysis of randomized controlled trials

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KOAH hastalarında weaning sonrası uygulanan NIMV geleneksel tedavi yöntemlerine göre re-entübasyon, mortalite oranlarını ve hastanede yatış süresini önemli şekilde azaltır.

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Received in revised form
3 December 2014
Accepted 9 December 2014
Available online 13 January 2015

Keywords:
Randomized controlled trial
Noninvasive ventilation
Reintubation
Extubation
Chronic obstructive pulmonary disease
Mechanical ventilation

The objective our meta-analysis is to update the evidence on the efficacy of noninvasive ventilation (NIV) compared with conventional oxygen therapy after planned extubation. We did a systematic literature review of database, including Pubmed, EMBASE, and Cochrane. We included randomized controlled trials comparing NIV with conventional oxygen therapy after planned extubation in medical intensive care unit (ICU) in our analysis. The results of our meta-analysis is consistent with the results of previous reviews and show that NIV decreased reintubation rate significantly as compared to conventional oxygen therapy in chronic obstructive pulmonary disease (COPD) and patients at high risk for extubation failure; COPD (RR, 0.33; 95% CI, 0.16–0.69; I2 = 0), high risk (RR, 0.47; 95% CI, 0.32–0.70; I2 = 0). However, in a mixed medical ICU population, there was no statistical difference of reintubation rate between the two groups (RR, 0.66; 95% CI, 0.25–1.73; I2 = 68%). Our study suggests that use of NIV after planned extubation significantly decreases the reintubation rate in COPD patients and patients at high risk for extubation failure, confirming the findings of previous reviews. There is no difference in the reintubation rate between the two groups in the mixed medical ICU population.

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RESEARCH CMAJ

Noninvasive ventilation as a weaning strategy for mechanical ventilation in adults with respiratory failure: a Cochrane systematic review

Karen E.A. Burns MD MSc, Maureen O. Meade MD MSc, Azra Premji MSc RRT, Neill K.J. Adhikari MDCM MSc

Özellikle KOAH'lı hastalarda NIMV ile yapılan weaning ile İMV'le yapılan weaning kıyaslandığında mortalite oranı, yoğun bakımda kalış süresi, total MV süresi, re-entübasyon ve trakeostomi oranı önemli derecede NIMV lehine düşük bulunmuştur.

Abstract

of databases, conference proceedings and grey literature. We included trials comparing extubation and immediate application of noninvasive ventilation with continued invasive weaning in adults on mechanical ventilation. Two reviewers each independently screened citations, assessed trial quality and abstracted data. Our primary outcome was mortality.

Results: We identified 16 trials involving 994 participants, most of whom had chronic obstructive pulmonary disease (COPD). Compared with invasive weaning, noninvasive weaning significantly reduced mortality (risk ratio [RR] 0.53, 95% confidence interval [CI] cant effect on the duration of ventilation related to weaning, but significantly reduced rates of tracheostomy (RR 0.19, 95% CI 0.08 to 0.47) and reintubation (RR 0.65, 95% CI 0.44 to 0.97). Mortality benefits were significantly greater in trials enrolling patients with COPD than in trials enrolling mixed patient populations (RR 0.36 [95% CI 0.24 to 0.56] v. RR 0.81 [95% CI 0.47 to 1.40]).

Interpretation: Noninvasive weaning reduces rates of death and pneumonia without increasing the risk of weaning failure or reintubation. In subgroup analyses, mortality benefits were significantly greater in patients with COPD.

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CMAJ 2014. DOI:10.1503/cmaj.130974

Review: Noninvasive vs invasive weaning from mechanical ventilation reduces mortality in respiratory failure

Burns KE, Meade MO, Premji A, Adhikari NK. Noninvasive ventilation as a weaning strategy for mechanical ventilation in adults with respiratory failure: a Cochrane systematic review. CMAJ. 2014; 186:E112-22.

Clinical impact ratings: CC ★★★★★★☆ PM ★★★★★★☆

Question

In mechanically ventilated patients with respiratory failure, does noninvasive weaning reduce mortality compared with invasive weaning?

Review scope

Included studies compared extubation plus immediate noninvasive ventilation (NIV) with continued invasive weaning in adults with respiratory failure who needed invasive mechanical ventilation for ≥ 24 hours. Exclusion criteria were immediate postoperative settings, NIV after unplanned extubation, and comparison of NIV with unassisted oxygen supplementation. The primary outcome was mortality. Other outcomes included ventilator-associated pneumonia (VAP), weaning failure, intensive care unit (ICU) length of stay, mechanical ventilation duration, and adverse events.

compared with invasive weaning; groups did not differ for arrhythmia (3 trials, *n* = 201, RRR 11%, CI –134 to 66).

Conclusion

In mechanically ventilated patients with respiratory failure, noninvasive weaning reduces mortality, ventilator-associated pneumonia, and weaning failure compared with invasive weaning.

Source of funding: No external funding.

For correspondence: Dr. K.E. Burns, University of Toronto, Toronto, ON, Canada. E-mail burnsk@smh.ca.

Commentary

Although frequently life-saving, mechanical ventilation can result in such complications as VAP, which prolong length of stay and increase mortality. NIV was initially developed as an alternative

Noninvasive vs invasive weaning in mechanically ventilated adults with respiratory failure*

Outcomes	Number of trials (*n*)	Weighted event rates		RRR (95% CI)	NNT (CI)
		Noninvasive weaning	Invasive weaning		
Mortality	16 (994)	12%	23%	47% (20 to 64)	10 (7 to 22)
Ventilator-associated pneumonia	14 (953)	7.4%	30%	75% (57 to 85)	5 (4 to 6)
Weaning failure	8 (605)	23%	36%	37% (4 to 58)	8 (5 to 70)
				Mean difference (CI)	
Length of ICU stay, d	13 (907)			–5.6 (–7.9 to –3.3)	
Duration of mechanical ventilation, d	7 (385)			–5.6 (–9.5 to –1.8)	

**ICU = intensive care unit; other abbreviations defined in Glossary. Weighted event rates, RRR, NNT, and CI calculated from risk ratios and control event rates in article using a random-effects model.*

Astım

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journal homepage: www.jccjournal.org

Noninvasive ventilation in acute asthma☆

Michael Pallin, MB, Matthew T. Naughton, MD*

Department of Allergy, Immunology and Respiratory Medicine, The Alfred Hospital, Melbourne, Australia

Astım hastalarında NIMV'nun mortalite, entübasyon oranları ve hastanede kalış süresi üzerine olumlu etkisi ile ilgili herhangi bir kanıt yoktur.

ARTICLE INFO

ABSTRACT

Noninvasive ventilation (NIV) has well-recognized benefits in acute exacerbation of chronic obstructive

acute asthma setting has been shown to be associated with improvements in important physiological variables including measures of airflow and respiratory rate, and lends support to further study in this field. Improvements in airflow may be a direct effect of applied positive airway pressure or an indirect effect secondary to better dispersal of aerosolized medication. Reductions observed in respiratory rate and dyspnea are likely influenced by the amount of pressure support provided. Evidence suggestive of any improvement in mortality, intubation rate, or hospital/intensive care unit length of stay, however, is lacking. Studies to date have been hampered by small numbers and a lack of demonstrable meaningful clinical outcomes. Data relating to mortality, endotracheal intubation rates, and hospital length of stay/admission should be sought in future large clinical trials.

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Official Journal of the Asian Pacific Society of Respirology
Respirology

ORIGINAL ARTICLE

Is non-invasive ventilation safe in acute severe asthma?

MICHAEL PALLIN, MARK HEW AND MATTHEW T. NAUGHTON

Department of Allergy, Immunology and Respiratory Medicine, Alfred Hospital and Monash University, Melbourne, Victoria, Australia

NIMV uygulanan orta dereceli ve şiddetli akut astım atağı olan hastalarda 5 yıl boyunca önemli bir komplikasyon gelişmedi.

ABSTRACT

control group with less severe asthma without ventilatory support.

Results: Eight hundred seventy-three patients had acute severe asthma of whom 30 were treated with NIV, 17 with IMV and 90 served as controls. The mean duration of NIV was 9.5 ± 7.3 h with inspiratory positive airway pressure and expiratory positive airway pressure of 11.9 ± 1.4 and 5.8 ± 1.2 cmH_2O respectively. Mortality was zero in the NIV and control groups, compared with 41% in the IMV group. None of the NIV or control groups required escalation to invasive ventilation. There were no instances of haemodynamic compromise in the NIV or control groups. Length of hospital stay was 121 ± 96 h in the NIV group and similar to the severe IMV group (136 ± 99 h, $P > 0.05$) and significantly longer than the control group (42 ± 40 h, $P < 0.05$).

Conclusions: NIV can be safely used in acute severe asthma although further work is needed to delineate the precise patient selection process.

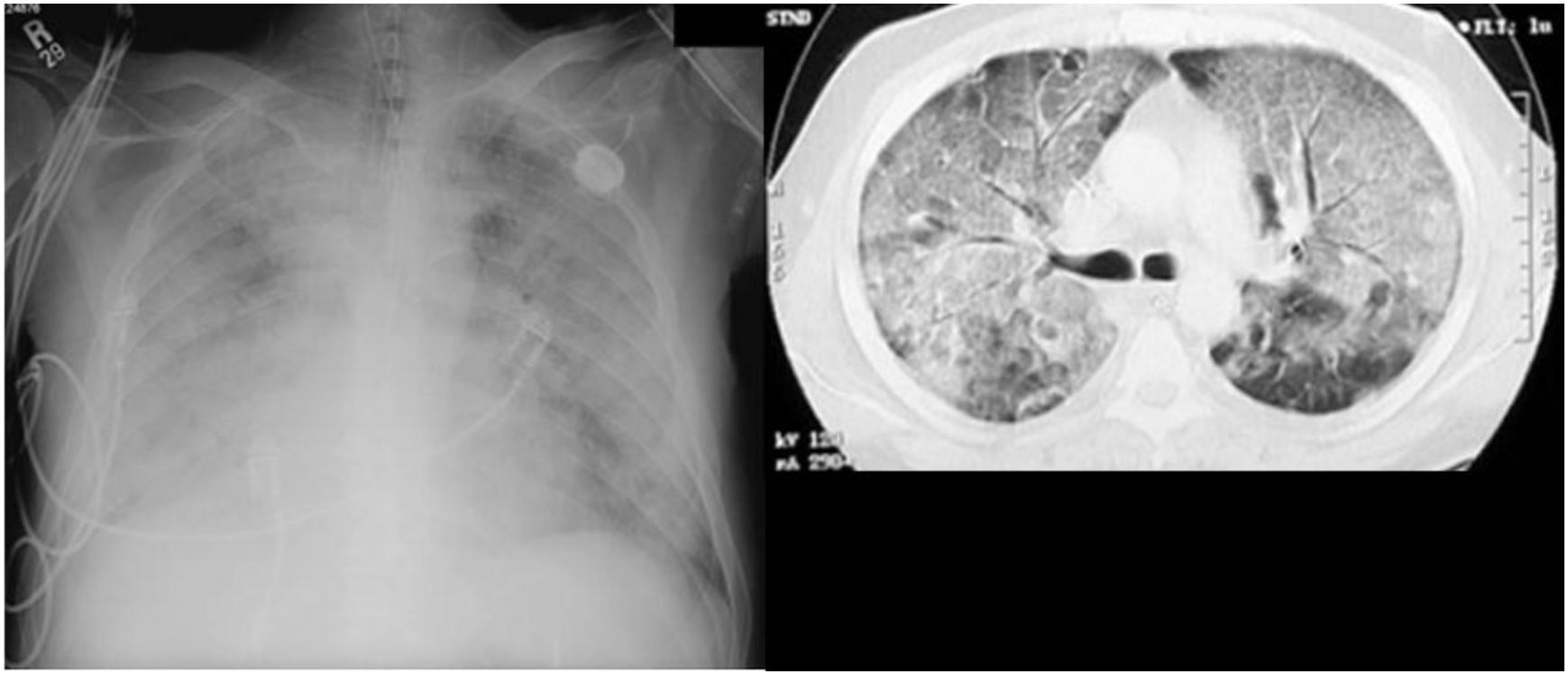
Key words: asthma, mechanical ventilation, morbidity, mortality, non-invasive ventilation.

SUMMARY AT A GLANCE

agement,[2,3] asthma still causes 1 in every 250 deaths.[4] Acute exacerbations of asthma requiring hospital admission are associated with a mortality of between 0.4% and 0.9%.[5,6] However, in the setting of a severe exacerbation necessitating intensive care unit admission, often with invasive mechanical ventilation (IMV), mortality may approach 10%.[2]

Despite standard care in the management of acute asthma,[7] some patients fail to improve and require endotracheal intubation for IMV. Although lifesaving in dire circumstances, IMV should also be used with caution, as it is associated with significant complications in asthmatics. Mortality is estimated to be three times as high in those patients receiving IMV compared with non-ventilated asthmatics;[8] barotrauma occurs in 2–6% of patients;[9,10] ventilator-associated pneumonia may occur as often as 7%;[9,10] generalized, including respiratory muscle weakness occurs in up to 13% of patients[9] and intensive care unit/hospital

ARDS



Journal of Critical Care 31 (2016) 26–30

Contents lists available at ScienceDirect

Journal of Critical Care

journal homepage: www.jccjournal.org

Acute respiratory distress syndrome: Predictors of noninvasive ventilation failure and intensive care unit mortality in clinical practice☆,☆☆

Rajesh Chawla [a,*], Jaimin Mansuriya [a], Nikhil Modi [a], Abha Pandey [a], Deven Juneja [b]

PaO2 / FiO2 oranı düşük olan şiddetli ARDS olgularında ve septik şok tablosunda olan ARDS olgularında NIMV başarı oranı oldukça düşüktür. Hatta entübasyonun gecikmesine neden olarak hastanın prognozunu kötü yönde etkiler.

fulfilled criteria for ARDS by the Berlin definition. Basic demographics, ventilatory support, intensive care unit course, and outcome were recorded.

Results: Of 170 patients, 96 (56.47%) were initially managed with NIV. Noninvasive ventilation failure was seen in 42 (43.75%) of 96, and low baseline Pao_2/Fio_2, shock, and ARDS severity were associated with NIV failure. Overall intensive care unit mortality was 63 (37.1%) of 170, and high Acute Physiology and Chronic Health Evaluation II score, low Pao_2/Fio_2, shock, and ARDS severity were associated with increased mortality. Noninvasive ventilation failure and mortality were significantly higher in moderate and severe ARDS.

Conclusions: Noninvasive ventilation maybe useful in selected patients with mild ARDS but should be used with great caution in moderate and severe ARDS, as failure risk is high. In addition, low Pao_2/Fio_2 and shock are associated with NIV failure. Acute Physiology and Chronic Health Evaluation II score, shock, low Pao_2/Fio_2, and ARDS severity are associated with increased mortality.

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Noninvasive ventilation in acute respiratory distress syndrome: Primum non nocere☆

ARDS olgularında sadece seçilmiş vakalarda NIMV denenebilir.
1- Hafif şiddette ARDS
2- Organ yetmezliği ya da şok tablosunda olmayan
NIMV 1-3 saat denenir ve şayet başarısız ise İMV geçilmeli

The authors do not provide any data on the trends of clinical and blood gas parameters after the initiation of NIV. No details have been provided on the inspiratory and expiratory positive airway pressure administered during NIV. Furthermore, the study included patients even with hypotension and severe hypoxemia. The current evidence does not support the use of NIV in patients with hemodynamic instability, multiorgan dysfunction, and severe hypoxemia ($Pao_2/Fio_2 < 100$), mak-

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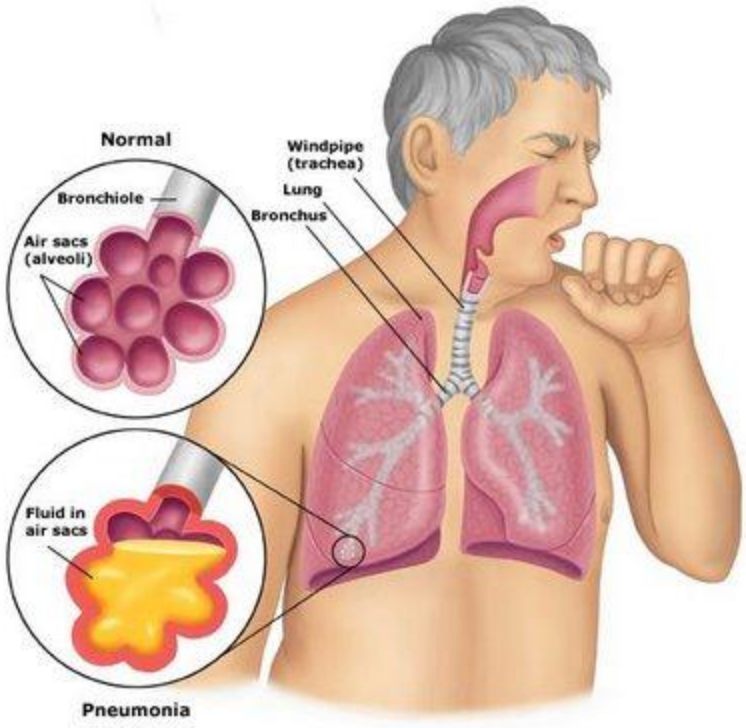
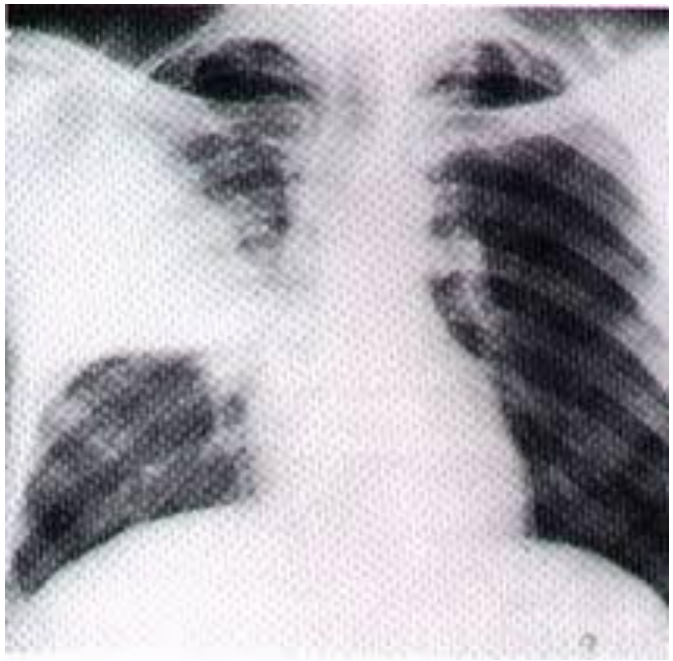
PNÖMONİ


Normal
Bronchiole
Air sacs (alveoli)
Fluid in air sacs
Windpipe (trachea)
Lung
Bronchus
Pneumonia



European Journal of Internal Medicine 23 (2012) 420–428

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European Journal of Internal Medicine

journal homepage: www.elsevier.com/locate/ejim

Review article

The use of non-invasive ventilation during acute respiratory failure due to pneumonia☆

Miquel Ferrer [a,*], Roberto Cosentini [b], Stefano Nava [c]

- Akut solunum yetmezliği gelişen toplum kaynaklı pnömoni olgularında NIMV yüksek oranda başarısızlıkla sonuçlanmaktadır.
- Hatta entübasyonda gecikmeye yol açtığı için mortalite oranlarını arttırabilir.
- Sadece KOAH zemini olan hastalarda faydalı olabilir.

Received in revised form 21 February 2012
Accepted 21 February 2012
Available online 28 March 2012

Keywords:
Non-invasive ventilation
Acute hypoxemic respiratory failure
Severe pneumonia
Continuous positive airway pressure

failure. The populations of patients with community-acquired pneumonia who have demonstrated better response to non-invasive ventilation are those with previous cardiac or respiratory disease, particularly chronic obstructive pulmonary disease. By contrast, the use of non-invasive ventilation in patients with community-acquired pneumonia without these pre-existing diseases should be very cautious and under strict monitoring conditions, since there are increasing evidences that the unnecessary delay in intubation of those patients who fail treatment with non-invasive ventilation is associated with lower survival.

Pulmonary complications of immunosuppressed patients are associated with high rates of intubation and mortality. The use of non-invasive ventilation in these patients may decrease the need for intubation and improve the poor outcome associated with these complications.

Continuous positive airway pressure has been used to treat acute respiratory failure in several conditions characterised by alveolar collapse. While this is extremely useful in patients with acute cardiogenic pulmonary oedema, the efficacy in pneumonia seems limited to immunosuppressed patients with pulmonary complications. Conversely, there are no sufficient evidences on the efficacy of continuous positive airway pressure in immunocompetent patients with pneumonia and severe acute respiratory failure.

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The role of noninvasive positive pressure ventilation in community-acquired pneumonia☆,☆☆,★

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Akut solunum yetmezliği gelişen toplum kaynaklı pnömoni olgularında NIMV yüksek oranda başarısızlıkla sonuçlanmaktadır.

Noninvasive ventilation
Community-acquired pneumonia
Outcomes

ventilation who are admitted an intensive care unit.

Methods: A retrospective cohort study of all consecutive patients admitted to 3 tertiary care, university-affiliated, intensive care units from January 2007 to January 2012 with the principal diagnosis of CAP and requiring positive pressure ventilation was carried out. The primary outcome was acute hospital mortality. Univariable and multivariable analysis were performed to assess the association between mode of ventilation and death as well as factors associated with failure of NIV.

Results: A total of 229 patients were admitted, with 20 patients excluded from the analysis because of do-not-resuscitate orders. Fifty-six percent of patients were initially treated with NIV. Of those, 76% failed NIV and required intubation and invasive ventilation. After adjusting for confounders, no difference in mortality was seen between patients who received NIV as first-line therapy in comparison with patients who received invasive ventilation (odds ratio [OR], 1.63; 95% confidence interval [CI], 0.81-3.28; $P = .17$). Multivariable analysis demonstrated a trend toward increased NIV failure for the patients who had higher Acute Physiology and Chronic Health Evaluation II scores ($P = .07$) and vasopressor use at 2 hours after initiation of positive pressure ventilation (OR, 7.5; 95% CI, 1.8-31.3, $P = .006$). In an adjusted analysis, patients who failed NIV had an increased odds of death when compared with patients who were treated with invasive ventilation (OR, 2.2; 95% CI, 1.0-4.8; $P = .03$).

Conclusion: Noninvasive pressure ventilation is frequently used in CAP but is associated with high failure rates. Mortality was not improved in the group of patients who received NIV as first-line therapy despite clinical characteristics that might have suggested a more favorable prognosis. Given the high rates of NIV use, high failure rates, and the hypothesis generating nature of the data in this study, further randomized studies are needed to better delineate the role of NIV in CAP.

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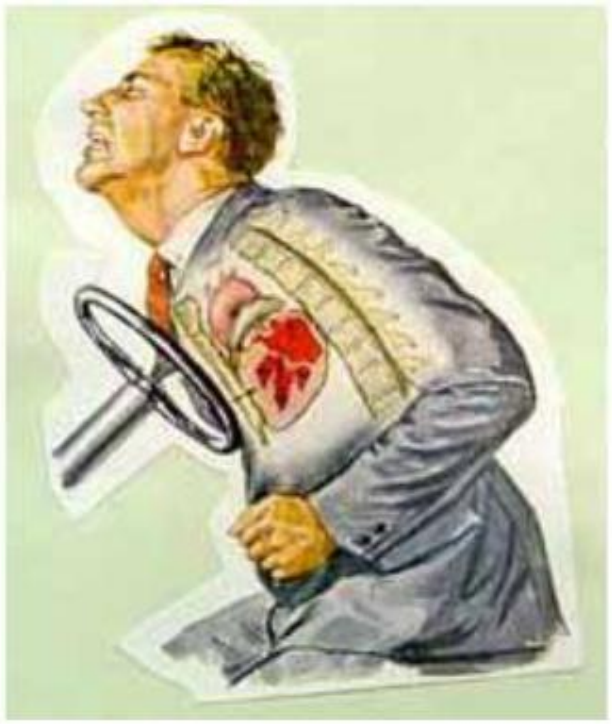
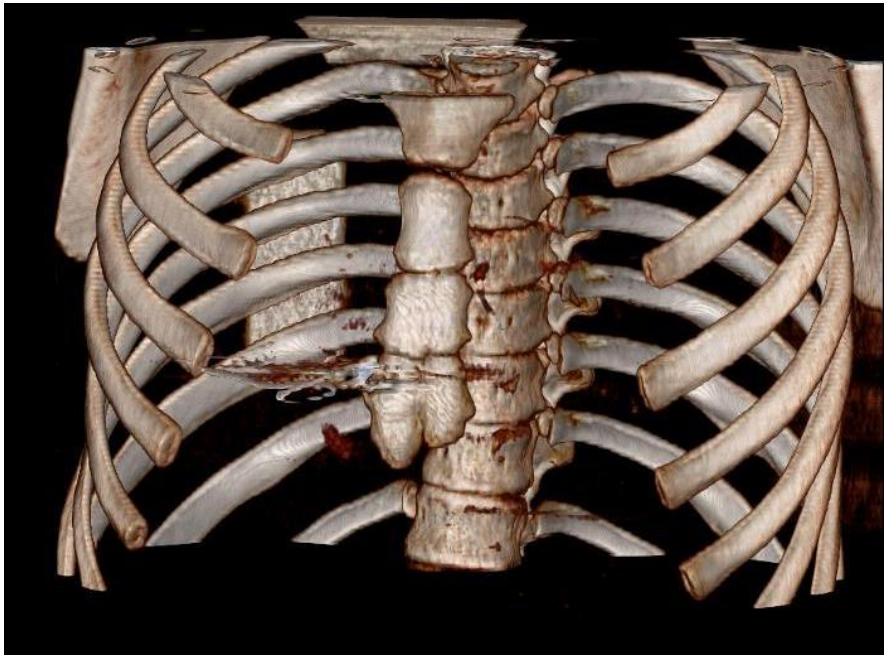
Toraks Travması





ANNALS OF EMERGENCY MEDICINE JULY 2014

Systematic Review Snapshot

TAKE-HOME MESSAGE

Noninvasive ventilation in chest trauma patients may reduce the requirement for intubation and may reduce mortality.

METHODS

DATA SOURCES

A computerized search of MEDLINE and EMBASE was performed to identify studies for

Does Noninvasive Ventilation Have a Role in Chest Trauma Patients?

EBEM Commentators
Angela Hua, MD
Kaushal H. Shah, MD
Department of Emergency
Mount Sinai Medical Cen
New York, NY

Hangi hastalar seçilmeli ?
Ne zaman uygulanmalı ?
Başarı/Başarısızlık etkenleri ?

Duggal *et al. Critical Care* 2013, **17**:R142
http://ccforum.com/content/17/4/R142

CRITICAL CARE

RESEARCH Open Access

Safety and efficacy of noninvasive ventilation in patients with blunt chest trauma: a systematic review

Abhijit Duggal[1], Pablo Perez[2], Eyal Golan[3,4], Lorraine Tremblay[2,3,5] and Tasnim Sinuff[2,3*]

Abstract

- Hemodinamik ve nörolojik olarak stabil olan ve respiratuar distress olmayan toraks travmalı hastalarda NIMV uygulanabilir.
- Erken dönemde uygulanmalıdır.
- Ancak kanıt düzeyi yeterli olmadığı için daha fazla çalışmaya ihtiyaç vardır.

severity of injuries, degree of hypoxemia and timing of enrollment. One RCT of moderate quality assessed the use of NPPV early in the disease process before the development of respiratory distress. All others evaluated the use of NPPV and CPAP in patients with blunt chest trauma after the development of respiratory distress. Overall, up to 18% of patients enrolled in the NIV group needed intubation. The duration of NIV use was highly variable, but NIV use itself was not associated with significant morbidity or mortality. Four low-quality observational studies compared NIV to invasive mechanical ventilation in patients with respiratory distress and showed decreased ICU stay (5.3 to 16 days vs 9.5 to 15 days), complications (0% to 18% vs 38% to 49%) and mortality (0% to 9% vs 6% to 50%) in the NIV group.

Conclusions: Early use of NIV in appropriately identified patients with chest trauma and without respiratory distress may prevent intubation and decrease complications and ICU length of stay. Use of NIV to prevent intubation in patients with chest trauma who have ALI associated with respiratory distress remains controversial because of the lack of good-quality data.

A novel non-invasive ventilation mask to prevent and manage respiratory failure during fiberoptic bronchoscopy, gastroscopy and transesophageal echocardiography

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ABSTRACT

Fiberoptic bronchoscopy (for difficult intubation, bronchoalveolar lavage or biopsies), gastric endoscopies and transesophageal echocardiography (for transfemoral aortic valve replacement, MitraClip or left atrial appendage closure), are widespread diagnostic and therapeutic procedures. Non-invasive ventilation during upper endoscopies can be used to prevent or treat acute respiratory failure especially in high risk or sedated patients. We describe a novel full face mask specifically developed not only for "elective" non-invasive ventilation during upper endoscopies but also for emergent application without probe removal. The mask is formed by two halves fixed only at the upper extremity allowing opening and closure while the probe is in place. Position of the port and shape of the mask allow easy insertion (through the nose or the mouth) and handling of different sized probes. The mask, commercialized as "Janus", preserves arterial oxygenation during procedures in spontaneously breathing patients with or at risk of hypoxemia (mainly fiberoptic bronchoscopy for guided tracheal intubation or for bronchoalveolar lavage). In patients requiring a true ventilatory support (like patients with neuromuscular disease or those deeply sedated), Janus also allows effective manual or mechanical ventilation. Its use can improve safety, patient's comfort (as sedation can be titrated to the desired effect without fearing respiratory depression) and efficiency, avoiding time wasting and allowing procedure completion. Prospective trials are required to confirm its effectiveness.

Keywords: *non-invasive ventilation, endoscopy, transesophageal echocardiography, gastroscopy, bronchoscopy.*

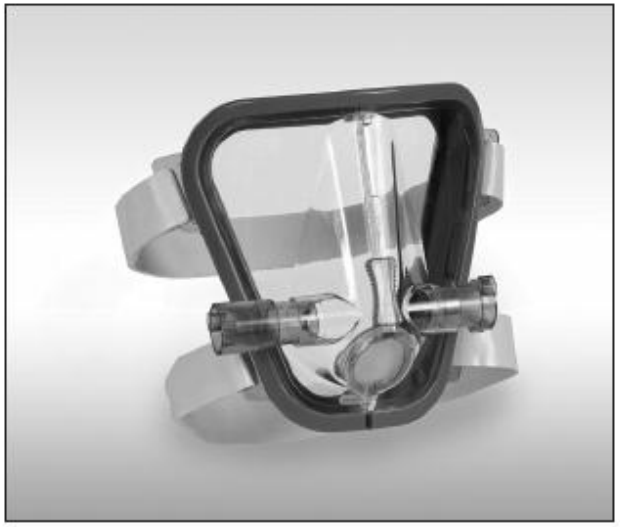

Figure 1 - *The Janus mask that allows fiberoptic bronchoscopy, gastroscopy and transesophageal echocardiography while delivering continuous positive airway pressure.*

Noninvasive Ventilation for the Emergency Physician

Michael C. Allison, MD[a], Michael E. Winters, MD[b,*]

KEY POINTS

- Bilevel positive airway pressure (BPAP) should be used in all cases of moderate to severe respiratory failure owing to exacerbations of chronic obstructive pulmonary disease.
- Continuous positive airway pressure or BPAP can be used in patients with acute exacerbations of cardiogenic pulmonary edema.
- Noninvasive monitoring (NIV) can be attempted in patients with asthma, traumatic respiratory failure, respiratory failure associated with immunosuppression, and community-acquired pneumonia.
- High-flow nasal cannula is an emerging therapy that may be useful to treat hypoxic respiratory failure.
- Patients started on NIV should be monitored closely. Signs and symptoms should be evaluated after 1 hour of NIV to determine success or failure of therapy.

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