Multiple organ dysfunction syndromes and mechanic ventilation

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Özet

Multiple Organ Disfonksiyonu Sendromu ve mekanik ventilasyon

Sistemik inflamatuar cevap sendromu ve multiple organ disfonksiyonu sendromu (MODS) yoğun bakım ünitelerinde karşılaşılan ortak bir sendromdur. Etkili bir önleme ve tedavi yöntemi henüz bulunamamıştır. Yüksek mortalite oranları erken tanı ve koruyucu tedavi ile azaltılabilir. Multiple organ disfonksiyonun (MOD) travma, yanık, şok, kardiyak arrest, çeşitli non-bakteriyel enfeksiyonlar ve belirli enfeksiyon odakları ile ortaya çıkabildiği belirtilmiştir. Başlatıcı olay ne olursa olsun, MODS genellikle tahmin edilebilir bir yol izler; tipik olarak akut respiratuvar distres sendromu ilktir. En önemli ve etkili tedavi; erken tanı ve enfeksiyon odağının elimine edilmesidir. Mortalite ve morbiditeyi azaltmak için erken mekanik ventilasyon ve dinamik destekleyici bakım uygulanmalıdır.

Anahtar Kelimeler: SIRS, MODS, ARDS, mekanik ventilasyon.

Abstract

Systemic inflammatory response syndrome and multiple organ dysfunction syndromes (MODS) are common syndromes in intensive care unit. An effective method of preventing and treatment could not yet be found. High mortality rates could be decreased by early diagnosis and predictive treatment. It has been demonstrated that multiple organ dysfunction may occur with trauma, burn, shock, cardiac arrest, various non-bacterial infection and certain infectious focus. MODS generally follow a predictable course; typically acute respiratuar distress syndrome is the first. The most important and effective treatment is early diagnosis and eliminating the infectious focus. Early mechanic ventilation and dynamic supportive care should be applied for reducing the mortality and morbidity.

Keywords: SIRS, MODS, ARDS, mechanic ventilation.

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SIRS and MODS are commonly seen syndromes that remain the biggest challenge in ICU and carry a high mortality (1). MODS could be defined as insufficiency of numerous organ systems or whole organ systems following serious infection, trauma or operation. Despite the recent advances in therapy regimens, an effective method of preventing and treatment could not yet be found (2). Mortality in MODS, secondary to the SIRS is 60-98% and due to the number of organ failed, but this high mortality rates could be decreased by early diagnosis and predictive treatment (3).

Tissue hypo perfusion is a common denominator in the pathogenesis of MODS (4,5). Consequently, it is followed by renal failure, liver function disturbances (jaundice, low serum albumin), gastro intestinal system (GIS) disturbance (stress ulcer, GIS hemorrhage) and metabolic insufficiency. The most commonly recognized initiators are the lipopolysaccharides (endotoxin), which are released by gram negative bacteria. The resulting response involves a complex interaction between macrophages/monocytes, neutrophils, lymphocytes, platelets and endothelial cells that can effect nearly every organ.

To identify organ failure more precisely, numerous scoring and classification schemes have been applied to MODS (6-8). In our study, we used the classification system of Goris et al (9). That is based on easily obtainable measurements of pulmoner, cardiac, renal, hepatic, hematologic, gut and central nerve system (CNS) function.

Case Report

Two female patients at 72 and 71 years old were admitted to the Suleyman Demirel University Emergency Service with similar complains and symptoms following each other in two days. Their physical examinations have been also found alike. They were both confused, agitated, tissue turgor-tonus was diminished and respiratory failure had been rapidly occurred after a respiratory tract infection. Examining the X-ray of the lungs, in both patients, infiltrations in both hemitorax and diminish in ventilation was seen.

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Table 1 : The presentation values of patients in emergency service.

		Patient 1	Patient 2
Age/Sex		72/female	71/female
Arterial Pressure		85/55 mmHg	90/50 mmHg
CBC	WBC	10.500 /mm^3	6.000 /mm^3
	Hb	11.5 g/dL	11.5 g/dL
	Htc	36.7 %	37.3 %
	Plt	98.000 /mm^3	143.000 /mm^3
Blood Gases Analyses	pO_2	68.7 mmHg	51 mmHg
	pCO_2	156.2 mmHg	59.5 mmHg
	$SatO_2$	77.2 %	70.5 %
	pH	6.926	7.073
Biochemical Analyses	Glucose	60 mg/dL	165 mg/dL
	Urea	96 mg/dL	180 mg/dL
	Creatinine	1.8 mg/dL	3 mg/dL
	CPK	198 U/L	507 U/L
	CK-MB	53 U/L	89 U/L
	ALT	763 U/L	1153 U/L
	AST	1301 U/L	1607 U/L
	Total	0.71 mg/dL	N mg/dL
	Ca^{++}	9.5 mmol/L	6.1 mmol/L
	K^{+}	4.2 mmol/L	7.1 mmol/L

When the patients were monitorized it was seen that they were both in severe acidosis and liver enzymes were significantly elevated while the urine out-put was decreased (Table 1) (For patient number 1; classification due to Goris et al (9) 6 point/for patient number 2; 7 point) (Table 2). For respiratory support patients were connected to mechanical ventilatory in SIMV mode. After one hour with mechanical ventilation acidosis was resolved. Antibiotherapy was applied with wide spectrum antibiotics cefapime (maxipime) in patient 1, and meropenem (Meronem) in patient 2 and supportive care was maintained. After these dynamic therapies, X-ray examination and blood gases analyses of two patients showed a significant improvement and urine output were in normal ranges. This improvement was also seen in liver enzymes and urea values. After these values obtained, patient 1 was extubated at 11th day and patient 2 at 5th day (Table 3).

Table 2 : Patient's scoring point due to Gorris et al.

Organ	Patient 1	Patient2
Pulmonary	1	1
Cardiac	1	1
Renal	0	1
Hepatic	2	2
Hematolojik	0	0
Gastrointestinal tract	0	0
Central nervous system	2	2

Conclusion

It has been demonstrated that MOD may occur with trauma, burn, shock, cardiac arrest, various non-bacterial infection and certain infectious focus. However, septicemia cases show more predilections to MODS compared to others. In critically ill cases, MOF may

Table 3 : Blood gases analyses performed after the extubation.

	Patient 1	Patient2
pO_2	76.2 mmHg	79.2 mmHg
pCO_2	40.2 mmHg	47.7 mmHg
$SatO_2$	94.8 %	93.7 %
pH	7.380	7.440

occur without any septic location. Regardless of the inciting event, MODS generally follow a predictable course. Typically, ARDS is the first, followed by renal and hepatic dysfunction. Myocardial failure is a later (and often preterminal) manifestation. The reason for early appearance of pulmonary failure is unclear; it may reflect a lesser functional reverse of the lung compared with liver or kidneys, or it may suggest that our ability to detect pulmonary dysfunction is more sensitive. The time course of MODS is variable, as it may be affected by the nature of the initial insult as well as by pre-existing disease. Early MODS (occurring with 72 h of the initial insult) appears to be associated with more cardiac dysfunction, and indices of shock are the critical risk factors. In contrast, late MODS (>72 h after the initial insult) is associated with more hepatic dysfunction and advanced age. Infections appear to be more prominent in its pathogenesis (10). Therefore, early mechanic ventilation and dynamic supportive care should be applied for reducing the mortality and morbidity.

MODS are associated with severe inflammatory response, the severity and progression of underlying cause and the age of the patient. The higher the age of the patient, the more decrease in physiological reserve.

For preventing MODS, the excessive stimulation and wide spreading of body defense mechanisms should be stopped; because of this, the most important and effective treatment is early diagnosis and eliminating the infectious focus.

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