

Introduction:

The diaphragm is considered as the main respiratory muscle, and its dysfunction predisposes to many respiratory complications. Ultrasound (US) is now an accepted method of measuring Diaphragmatic Excursion (DE) and Diaphragmatic thickness (DT). We aimed to detect The presence of Diaphragmatic Dysfunction among medical intensive care patients and its progression over first 4 days and the impact of DD on clinical outcome especially among shocked and mechanically ventilated subgroups.

Methods:

We prospectively recruited consecutively any critically ill adult requiring admission to MICU with SOFA ≥ 2 . Exclusion criteria: diaphragmatic or spine injury, neuromuscular disease, any usage during hospital stay of paralytic agents, aminoglycosides, sedatives or analgesia other than morphine. The right hemi-diaphragm was evaluated by M mode US for DE and B mode US for DT with the patients in the supine position. DT and DE and laboratory measurements were taken on admission and every 48hr for a total of 3 readings (Day 0, 2, 4). Patients were followed up for length of ICU stay and 30 day mortality. DD was diagnosed if a DT ≤ 0.2 cm and DE ≤ 1.0 cm.

Results:

The study included 106 subjects. In the total studied group mean Age was 51.4 ± 16.3 years, 49 (46.2 %) were males while 57 (53.7 %) were females. The mean SOFA was 5.33 ± 3.66 and Mean APACHE II was 15.42 ± 7.91 . DD group included 38 (35.8 %) vs. Non DD group included 68 (64.1 %) subjects ($p < 0.001$). DD was more common in MV than

spontaneous breathing Patients (76.3% vs. 23.6%, $p<0.001$). PaCO₂ was higher (48.2 ± 4.1 vs. 39.3 ± 6.9 mmHg, $p=0.01$) in DD vs. NDD group respectively. WBCs was higher ($15.18\times 10^3\pm 7.2\times 10^3$ vs. $11.78\times 10^3\pm 2.9\times 10^3$ cell/ml, $p=0.01$) in DD vs. NDD group respectively. Diaphragmatic thickness diminished on day 4 (0.19 ± 0.03 vs. 0.21 ± 0.04 cm, $p=0.010$) in shocked vs. stable group respectively. Diaphragmatic excursion decreased on day 2 (2.58 ± 0.54 vs. 2.94 ± 0.79 cm, $p=0.038$) and on day 4 (2.13 ± 0.62 vs. 2.65 ± 0.86 cm, $p=0.002$) in shocked vs. stable group respectively. Successful weaning was low (45.1% vs. 74.3%, $p=0.005$) in DD vs. NDD group respectively. LOS was higher (9.70 ± 0.4 vs. 6.68 ± 1.3 days, $p=0.02$) in DD vs. NDD group respectively. Mortality was higher (81.5% vs. 23.5%, $p<0.001$) in DD vs. NDD group respectively.

Conclusion:

DD occurs in nearly one third of critically ill patients and progressively increases over the first 4 days of MICU admission. DD incidence is much higher among mechanically ventilated and shocked subjects. PaCO₂ and WBCs were associated with a negative effect on diaphragmatic function. DD associated with a longer weaning time, longer ICU stay and a higher mortality.

Key words: **DIAPHRAGMATIC DYSFUNCTION BY ULTRASOUND ASSESSMENT**