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Assessment of respiratory function in patients with congenital heart diseases wearing face masks during the covid-19 pandemic

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Aim: to assess whether the use of a surgical and N95 mask by cardiopathic patients was associated with episodes of desaturation or respiratory distress.

Methods:

- We enrolled patients with heart disease divided in 2 groups: Group A composed of patients with functionally univentricular heart after palliative operation (Fontan or pulmonary banding) and Group B composed of patients with congenital heart disease after the biventricular anatomic correction .
- The study consisted in 2 sessions: one wearing a surgical mask, the second wearing a N95 mask. During each session, all subjects were monitored every 15 minutes, the first 30 minutes while not wearing a mask, and the next 30 minutes while wearing a mask; then performed a 12-minute walking test while wearing the mask.
- We tracked changes in partial pressure of end-tidal carbon dioxide (PETCO₂), oxygen saturation (SaO₂), pulse rate (PR) and respiratory rate (RR) over 72-minutes of mask-use through Masimo Patient Monitoring System (Rad-97™ with NomoLine Capnography)

Results:

- ❖ 11 patients enrolled, 45% males; the median age was 20.1 (7-40)
- ❖ The group A did not experience a statistically significant change in oxygen saturation, PETCO₂, pulse rate and respiratory rate throughout the duration of the study both wearing a surgical or N95 mask.
- ❖ The group B showed a significant increase in respiratory rate wearing a surgical mask and also of PETCO₂ and heart rate wearing a N95 mask after walking test.

Table 1: SaO₂, PR, RR, PETCO₂ during the test in all patients wearing surgical and N95 masks

	Patients wearing surgical mask					Patients wearing N95 mask				
	T15	T30	T45	T60	Twt	T15	T30	T45	T60	Twt
SaO ₂	97	97	97	97	96	97	97	96	96	95
%	95-98	95- 98	91-98	92-98	94-98	95 -98	94- 99	92-98	91-98	92-98
P _{ETCO₂}	31	31	32	32	35	31	31	35	36	37
mmHg	29-35	28-35	30-38	31-38	30-38	29-35	28-35	30-39	30-39	34-37
PR	90	90	85	88	95	88	90	90	88	99
pulsation	75-91	73-91	79-90	81-95	88-110	75-91	73-92	73-92	80-92	89-120
/min										
RR	20	20	22	21	26	20	20	22	24	28
breaths/	18-22	18-24	20-28	18-26	24-28	18-22	18-24	18-24	20-24	26-30
min										

Conclusion:

The use of surgical and N95 mask among patients with congenital heart diseases was not associated with changes in respiratory function at rest, while the use of a N95 mask could cause breathing difficulties during a physical activity. Surprisingly, the group A showed a better adaptation to the use of the mask, probably related to their chronic compensation condition. Therefore, we feel that a surgical mask represents the best personal protective option for these patients, but in order to obtain maximum protective effectiveness, universal face masking is essential.