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Severe Acute Respiratory Syndrome

Iatrogenic Foreign Body in Maxillary Sinus

Highlights

Patients with Chronic Rhinosinusitis

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Discovering Thoughts, Inventing Future



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## Metallic Dental Burr as an Iatrogenic Foreign Body in Maxillary Sinus- A Case Report

By Professor Dr. S. K. Ballav, Dr. Shailendra Nath Biswas,  
Dr. Seikh Farid Uddin Ahmed & Dr. Shahidur Rahman

**Abstract-** The foreign body in the maxillary sinus is quite a rare incidence. It may found in the case of maxillofacial trauma causing displacement of the tooth into maxillary sinus. The metallic foreign body may happen in case of gunshot injury and bullet, or pellet may retain in the maxillary sinus. Very rarely metallic foreign body like a dental burr may get lodged into maxillary sinus during dental procedure. If it happens ENT surgeon may be called upon to deal the foreign body. In this article we will describe a case that was referred to the ENT department, Khulna Medical College Hospital for removal of a dental burr retained in maxillary sinus. The accident happened in Dental department of the same hospital. We reviewed the options for the removal of the foreign body. There are two accepted approaches open and endoscopic for management of such cases. We successfully removed the foreign body through open approach.

**Keywords:** maxillary sinus, caldwell-luc, foreign body, dental burr.

**GJMR-F Classification:** NLMC Code: WU 105



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# Metallic Dental Burr as an Iatrogenic Foreign Body in Maxillary Sinus- A Case Report

Professor Dr. S. K. Ballav <sup>α</sup>, Dr. Shailendra Nath Biswas <sup>σ</sup>, Dr. Seikh Farid Uddin Ahmed <sup>ρ</sup>,  
& Dr. Shahidur Rahman <sup>ω</sup>

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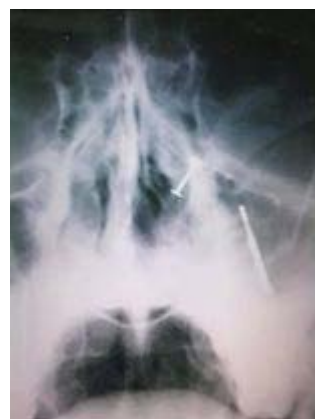
## I. INTRODUCTION

Foreign body in the maxillary sinus is very rare. The causes of foreign bodies in maxillary sinus may be due to penetrating trauma or iatrogenic escape of tooth during extraction or escape of tooth impression material through a preexisting oroantral fistula. At literature search we found only four case reports of dental burr as maxillary sinus foreign body. Patients with this complication usually referred to ENT department. So, it is important to be familiar with these complications and its management.

## II. CASE REPORT

A female patient aged about 32 years presented to us with the history of 2nd left upper molar tooth extraction in Dental OPD of Khulna Medical College Hospital. During the procedure powered dental drill was used. The burr of the drill was displaced in the tooth socket and identified by the dentist who attempted to remove it while the burr got entry into the maxillary

sinus. The patient was sent to ENT department for checkup. On routine clinical examination we found no active bleeding from the tooth socket, no nasal discharge, and no obvious evidence of oroantral fistula. Patient was bit anxious but otherwise not associated with any other health issue. Xray of paranasal sinuses done and it showed a radio opaque foreign body looking like a dental burr in the left maxillary sinus and no retained tooth route. (Figure-1).



(Figure-1)



(Figure-2)

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(Figure-3)

We planned for removal of the foreign body through open approach. Next day we performed left Caldwell-Luc procedure under general anesthesia. We found and removed the dental burr from the left maxillary sinus (Figure -2, 3).

We did trans antral endoscopic examination and found no evidence of oroantral fistula. The patient was discharged after 48 hours and followed up after 7 days. The patient had recovered completely. Nasal Endoscopic approach may also be considered to

remove the foreign body depending upon the size and location of the foreign body.

### III. DISCUSSION

The floor of the maxillary sinus is separated from the roots of upper premolar, molar sometimes canine teeth by very thin plate of bone of alveolar sockets<sup>1</sup>. In some people alveolar roof is dehiscant and only covered by sinus mucosa. So, any dental procedure in these teeth may cause complications in the sinus. In this case report a metallic dental burr was accidentally displaced into left maxillary sinus during surgical extraction of left upper second molar tooth.

Accidental dislodgment of dental burr into maxillary sinus during dental procedures is extremely rare<sup>3</sup>. We searched international medical literatures and found only five reported cases of dental burr foreign body in maxillary sinus like our case. All of them happened during dental procedures. Three such cases dealt with by Caldwell-Luc approach<sup>2</sup>. We also removed the dental metallic burr through Caldwell-Luc approach. Table 1 presents the cases in medical literature. We had added one more such case.

Case	Cause	Method of removal
Abe et al	Tooth extraction upper molar	Through the alveolar socket by forceps
Abe et al	Tooth extraction upper molar	Caldwell-Luc
Smith and Emko	Extraction upper premolar	Caldwell-Luc
Voss et al	Extraction upper molar	Combined transconjunctival & transnasal
Kalyvas Kapsalas	Extraction upper molar	Caldwell-Luc
Ballav et al	Extraction upper molar	Caldwell-Luc (present)

In our case probable explanation is the ill fitted burr into hand piece by the assistant and not checked by the dentist thereby the burr dislodged into the sinus through the alveolar socket. There was no retained tooth root. Though the burr made its way to sinus we did not find any oroantral fistula on trans antral endoscopic examination of the sinus. The removal of foreign body from maxillary sinus may be done by endoscopic approach too through nasal cavity or by classical Caldwell-Luc procedure<sup>3</sup>. The selection of method depends on type of foreign body. The endoscopic approach is less invasive than Caldwell-Luc<sup>4</sup>. On the other hands Caldwell-Luc is more invasive than Endoscopic procedure<sup>5</sup>. Caldwell-Luc is most suitable for any type of foreign bodies specially the elongated foreign body like dental burr located in the floor of the sinus<sup>6</sup>. It ensures direct visualization and removal of foreign body irrespective of size and shape and location of foreign body inside the maxillary sinus. With

advancement of imaging and endoscopic techniques, nasal and sinus endoscopic surgery is becoming the first-line approach for the removal of a foreign body from the maxillary sinus. If the foreign bodies are large enough, then their removal may not be easy by routine endoscopy.<sup>7</sup> Oroantral communications should be treated by establishing a physical barrier between oral cavity and maxillary sinus, and numerous surgical techniques have been introduced for repair, including rotating or advancing local tissues such as the buccal or palatal mucosa, buccal fat pad, submucosal tissue, or tongue tissue.<sup>8</sup> Small foreign bodies may be transported by the cilia of the epithelial lining in the maxillary sinus in the mucus-containing fluid against the influence of gravity, up the nasal wall of the sinus and out into the nose via the ostium<sup>9</sup>. Iatrogenic foreign body migration into maxillary sinus remains relatively rare complication, though exact morbidity seems to be underestimated and still rising.<sup>10</sup>

#### IV. CONCLUSION

Rare things are not rare. Any suspected foreign body in the maxillary sinus should be confirmed by radiography and removed. The reaction of mucosa to foreign body may interfere the muco-ciliary clearance leading to chronic sinus infection. Dental burr foreign body in maxillary sinus only can happen during dental procedure while using the drill due to inappropriate fitting of the burr into the hand piece or may be due to defect in hand piece. So, these tools should be checked before use. The classical surgical method of removal of foreign bodies from maxillary sinus is Caldwell-Luc procedure that requires a sublabial maxillary antrostomy. Due to recent technological advancement trans nasal endoscopic approach may also be considered. The ENT surgeons may be called upon to deal with this problem of foreign body in maxillary sinus. ENT surgeons should be knowledgeable to manage this kind of accidental foreign body in maxillary sinus.

#### *Conflicts of interest*

The authors declare that there is no conflict of interest.

#### REFERENCES RÉFÉRENCES REFERENCIAS

1. J.L smith and P. Emko, Management of a maxillary sinus foreign body (dental bur), Ear, Nose & Throat Journal, vol.86, no 11, pp677-678, 2007.
2. K. Abe, K. Beppu, M. Shinohara, and M. Oka, An iatrogenic foreign body (dental bur) in the maxillary antrum: A report of two cases. British Dental Journal, vol.173, no. 2, pp.63-65, 1992.
3. F. B. Basturk, D. Turkydin, S. Aktop, and H. S. Ovecoglu, An iatrogenic foreign body in the maxillary sinus: report of an unusual case, Journal of Otolaryngology and Rhinology, vol5, p.54, 2019.
4. R. Sharma, R. Minhas, and N. Mohindroo, An unusual foreign body in the paranasal sinuses, Indian Journal of Otolaryngology and Head & Neck Surgery, vol60,n.1,pp.88-90,2008
5. F. Pagella, E. Emanuelli, and P. Castelnovo, Endoscopic extraction of a metal foreign body from the maxillary sinus, The laryngoscope, vol.109no. 2, pp. 339-342, 1999.
6. H. Murata, S. Kida, K. Miura et al. A foreign body in the maxillary sinus; report of three cases Jpn J Oral Surg; 33: 1024, 1987.
7. N. Arimbrathodi, W. Aslam, A. Menon, A A Alsadi. Endoscopic removal of an uncommon iatrogenic foreign body from the maxillary sinus: A dental burr, Case reports in Otolaryngology Vol 2020/ Article ID 8861701/<https://doi.org/10.1155/2020/8861701>
8. Shahin YF, Muderris T, Bercin S, Sevil E, Kiris M. Chronic Maxillary Sinusitis Associated with an Unusual Foreign Body: A Case Report. Case Reports in Otolaryngology. 2012; Article ID 903714, 4 pages.
9. Fatima B B, Dilek T, Sertac A and Hensa S. An Iatrogenic Foreign Body in the Maxillary Sinus: Report of an Unusual Case. Journal of Otolaryngolgy and Rhinology. Case Report /Open Access DOI: 10.23937/2572-4193.1510054.
10. Wojtera B, Wozna A, & Komisarek o. The management of Foreign Body Displacement into the Maxillary Sinus as a Complication of Maxillofacial Interventions: Systemic Review. Indian J Otolaryngol Head Neck Surg (2020). <https://doi.org/10.1007/s12070-020-02153-9>





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## Pulmonary Function Tests in Patients with Chronic Rhinosinusitis: A Comparative Study

By Prof Dr. Ramesh Azad, Dr. Siddharth Sharma & Dr. Sunil Sharma

**Abstract-** Coexistence of upper and lower respiratory diseases has long been known. Since chronic rhinosinusitis and pulmonary diseases are closely related this study was made to observe the pulmonary function of patients with chronic rhinosinusitis.

**Methods:** The study was conducted in the Department of ENT and Pulmonary Medicine, IGMC Shimla on 27 adult patients of chronic rhinosinusitis and 26 age matched healthy control subjects between November 2018 and November 2019. The pulmonary function tests were performed using a spirometry and included Vital Capacity (VC) , Forced vital capacity (FVC) , Forced expiratory volume in one second (FEV1) and Forced expiratory volume in one second by Forced vital capacity ratio (FEV1/FVC).

**Results:** Following observations were made from the results of the study, among controls majority of the subjects i.e 23 (92%) had a normal PFT with only 1 patient (4%) had mild and another 1 patient (4%) had moderate restriction on PFT. Whereas among the patients group 10 patients (37%) had a normal pre-operative baseline PFT. Another 10 (37%) and 7 patients (25.9%) had mild and moderate obstruction respectively.

**Keywords:** chronic rhinosinusitis, unified airway, PFT, lung function.

**GJMR-F Classification:** NLMC Code: WG 269



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**Conclusion:** Findings of the current study suggest that there are latent derangements in the pulmonary functions of patients with upper airway disease i.e chronic rhinosinusitis and the difference between the pulmonary functions of patients and controls is significant. Hence our study validates the Unified airway disease model and suggests that lower airway evaluation shall be done in patients with chronic upper airway disease and a timely diagnosis and intervention could be beneficial for the pulmonary diseases.

**Keywords:** chronic rhinosinusitis, unified airway, PFT, lung function.

## I. INTRODUCTION

Chronic rhinosinusitis (CRS) is an inflammatory disease of the mucosa of the nasal cavity and paranasal sinuses, with symptoms lasting 12 weeks or more. It is a common disease and represents a public health problem resulting in socioeconomic burden throughout the world[1]. The exact pathogenesis of CRS is still not clearly understood; it significantly affects quality-of-life measures with decrements in general health perception and social functioning. It has been long recognized that diseases coexist in the upper and lower airways. The "United-Airways" concept implies that there is a link between upper and lower airway inflammation[2].

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Galenus was the first to note an association of nasal symptoms and asthma in the 2nd century he defined the nose as a respiratory instrument in his work "De usu partium". From the literature, it appears that Kariya et al[3] were the first to report the latent obstruction in low diameter airways associated with CRS. Their suggestion was that obstructive pulmonary alterations were present in CRS cases, even where they caused no symptoms and had not led to a diagnosis of obstructive airway disease. Chien et al[4] reported that chronic obstructive pulmonary disease was associated with an increased risk of Chronic rhinosinusitis without nasal polyps, independent of a number of potential confounding factors. Both the upper and lower respiratory tracts are continually exposed to gases and airborne particles. The importance of host defence mechanisms is vital. Physical barriers, mucociliary clearance systems with immune processes combine to protect the lung from damage. When abnormalities of these mechanisms occur, the patient may first present to the otolaryngologist before serious broncho-pulmonary involvement occurs. The mechanisms that connect upper and lower airway dysfunction are under investigation. They include a nasal-bronchial reflex, mouth breathing caused by nasal obstruction, and pulmonary aspiration of nasal contents and a direct evidence of an association could be obtained by examining the objective results of pulmonary function tests of patients with CRS and comparing them with results of healthy controls.

## II. METHODS AND MATERIALS

The study was conducted in the Departments of Otorhinolaryngology and Pulmonary medicine, Indra Gandhi Medical College, Shimla, Himachal Pradesh between November 2018 and November 2019.

### a) Study type

A hospital based study.

### b) Study Design

A comparative observational study.

### c) Subjects and Sample size

The study included 52 participants with 27 patients fulfilling the clinical criteria for CRS and 25 age matched healthy controls. The subjects in both groups belonged to the age group 18–60 years.

d) *Inclusion Criteria*

Patients suffering from CRS as documented by history, clinical examination and radiological investigations were included in the patients group. Symptoms and findings of CRS were based on the CRS criteria and divided into major and minor factors as established by the American Academy of Otolaryngology and Head and Neck Surgery in 1996. These parameters have since become widely adopted by researchers and by health maintenance organizations CRS diagnosis requires presence of at least 2 major factors or one major factor with 2 or more minor factors, or nasal purulence on examination.

e) *Exclusion Criteria*

- Pregnant women
- Coexistent systemic diseases like diabetes, hypertension, neoplasia.
- Patients with known psychiatric illness.
- Prior paranasal sinus, nose or throat surgery.

f) *Controls*

The study participants belonging to the same age group as patients group who presented to ENT OPD after ruling out CRS and the exclusion criteria by means of clinical examination and were taken as controls.

g) *Pulmonary Function Tests*

PFT were assessed using Spirometer, Vitalograph model number 6800. Spirometry is a powerful tool that can be used to detect, follow, and manage patients with lung disorders. It is reliable and relatively simple to incorporate into a routine office visit. To determine the validity of spirometric results, a Minimum of 3 acceptable maneuvers viz: FEV1 and FVC maneuver, VC and IC maneuver and Peak expiratory flow were done as per criteria laid down by latest ATS (American thoracic society) guidelines. In each test,

patients exhaled for at least six seconds and stopped when there was no volume change for one second. The test session was finished when the difference between the two largest FVC measurements and between the two largest FEV1 measurements was found to be within 0.2 L.

Results of spirometry were graded as per Gold 2017 standards[5]. The PFT values were considered to indicate significant airway obstruction when  $FEV1/FVC < 0.7$  and  $FEV1 < 80\%$  of the predicted value for a patient's age, height and weight.

h) *Statistical analysis*

Data is presented as frequency, percentages, and maximum minimum and mean  $\pm$ SD wherever applicable. Data is also depicted in tables and bar graphs wherever possible. Proportions are compared by Chi square as appropriate to the data set. Means are compared by student t test and a P value of  $< 0.05$  is considered to be statistically significant.

## III. RESULTS

A total of 52 adult subjects including 27 CRS patients and 25 healthy controls who presented to ENT OPD after thorough clinical history and physical examination were enrolled for the study after matching them with our inclusion and exclusion criteria.

a) *Age distribution of participants*

The age of participants included in patient group ranged from 18 to 60 years with a mean of  $40.59 \pm 13.49$  years. The maximum number of patients (15) belonged to 41-60 age group representing 55.6% of total, in control group age ranged from 30 to 60 years with a mean of  $48.68 \pm 11.32$  years with maximum participants in 41- 60 years representing 72% of the total. The data is depicted in Table 1.

Table 1: Age wise distribution of study group and control group

Age (in years)	Study group		Controls		Chi-square value	P value
	Frequency	Percentages	Frequency	Percentages		
$\leq 20$	2	7.4	0	0.0	3.201	0.362 NS
21-30	6	22.2	3	12.0		
31-40	4	14.8	4	16.0		
41-60	15	55.6	18	72.0		
Total	27	100.0	25	100.0		

Statistical Analysis: Chi-square test.  $P \leq 0.05$ : Statistically significant (S)

b) *Demographic profile of participants*

The weight of patients in the study group ranged from 35kg to 82 kg with a mean of  $61.56 \pm 13.45$  kgs. The height of the patients in study group ranged from 145cm to 185cm with a mean of  $165.07 \pm 10.38$ cm. The BMI ranged from 15 to 28.50 with a mean

of  $22.69 \pm 3.53$ . In the control group weight ranged from 35kg to 79 kg with a mean of  $60.12 \pm 11.37$ kg. Height ranged from 105cm to 180cm with a mean of  $160.16 \pm 15.35$ . Mean BMI among control group was  $22.60 \pm 3.50$ . The demographic data is represented in Table 2.

Table 2: Demography of participants

Statistics	Age (control)	Age (Patients)	Weight (Controls)	Weight (Patients)	Height (Controls)	Height (Patients)	BMI (Controls)	BMI (Patients)
Minimum	30	18.00	35.00	35.00	105.00	145.00	14.50	15.00
Maximum	60	60.00	79.00	82.00	180.00	185.00	29.30	28.50
Mean	48.68	40.59	60.12	61.56	160.16	165.07	22.60	22.69
Median	50.00	41.00	60.00	60.00	160.00	165.00	22.80	24.00
Std. deviation	11.32	13.41	11.37	13.45	15.35	10.38	3.50	3.53
Std. Error of mean	2.26	2.58	2.27	2.59	3.07	2.00	0.70	0.68

## c) PFT Values in controls

Majority of patients (23) in control group had a normal pulmonary function accounting for 92% of total whereas one patient each had mild and moderate restriction in pulmonary function test. Mean Vital

capacity among controls was 82.80% of predicted. The mean FVC was 90.08% of predicted value. FEV<sub>1</sub> mean was 72.89% of the predicted value. FEV<sub>1</sub>/FVC ratio had a mean 97.12% of the predicted value. The data is represented in Table 3.

Table 3: Pulmonary function in Control group

Statistics	VC/ Vital capacity	VC/ Vital capacity %*	FVC(L)	FVC%	FEV1(L)	FEV1%	FEV1/FVC	FEV1/FVC%
Minimum	1.85	60.00	1.99	72.00	1.58	50.00	1.07	70.00
Maximum	3.82	114.00	4.19	119.00	3.48	117.00	1.43	112.00
Mean	3.07	82.80	3.23	90.08	2.63	84.80	1.28	97.12
Median	3.33	83.00	3.36	88.00	2.68	84.00	1.29	100.00
Std. deviation	0.57	13.15	0.61	11.65	0.46	14.72	0.08	10.16
SE of mean	0.11	2.63	0.12	2.33	0.09	2.94	0.02	2.03

## d) PFT in patients group

Among patients group of 27, 10 (37%) had a normal pre-operative baseline PFT. Another 10 (37%) and 7(25.9) had mild and moderate obstruction. Mean Vital capacity of the patients was 74.59% of predicted.

The mean FVC was 81.15% of predicted value. FEV<sub>1</sub> mean was 72.89% of the predicted value. FEV<sub>1</sub>/FVC ratio had a mean 90.16% of the predicted value for patients. The data is represented in table 4.

Table 4: Pulmonary function in patients group

Statistics	VC (L)	VC %*	FVC(L)	FVC%	FEV <sub>1</sub> (L)	FEV <sub>1</sub> %	FEV <sub>1</sub> /FVC	FEV <sub>1</sub> /FVC%
Minimum	1.29	46.00	1.12	41.00	0.77	33.00	0.35	43.00
Maximum	3.96	97.00	5.00	112	3.57	105.00	0.95	115.00
Mean	2.60	74.59	2.75	81.15	2.08	72.89	0.73	90.19
Median	2.53	73.00	2.68	81.00	2.03	76.00	0.75	96.00
Std.deviation	0.80	14.41	0.90	18.21	0.70	19.01	0.14	18.38
S.E of mean	0.15	2.77	0.17	3.50	0.13	3.66	0.03	3.54

Our study observed that among controls out of 25 majority of the subjects i.e 23 (92%) had a normal PFT with only 1 patient (4%) had mild and another 1 patient had moderate restriction on PFT. Whereas among the patients group out a total of 27, 10 (37%) had a normal pre-operative baseline PFT. Another 10

(37%) and 7(25.9) had mild and moderate obstruction respectively.

The mean difference between the VC of controls and patients was 0.47 Litres with a p value of 0.018. The mean difference between the FVC of controls and patients was 0.48 litres with a p- value of 0.030. The

mean difference between the FEV<sub>1</sub> of controls and FEV<sub>1</sub> of patients was 0.55 Litres with a p-value of 0.002. The mean difference between the FEV<sub>1</sub> / FVC ratio of controls and patients was 0.55 with a p-value of 0.001.

Thus our study found a statistically significant differences between the PFT of the controls and patients with CRS among all the parameters studied.

#### IV. DISCUSSION

Respiratory tract infections are quite commonly managed by health care providers. A recent report from the Centers for Disease Control, respiratory infections (upper respiratory tract infections, otitis media, and lower respiratory tract infections) accounted for 16% of all outpatient visits of patients to physicians[6]. The nose functions as the air conditioner of human body delivering inspired air to the tracheobronchial tree which comes into contact with large surface area of the nasal mucosa permitting three physiological functions of: filtration, warming and humidification[7]. Inhalation of warm, moist air into the lower airway is required for the optimal functioning of the bronchopulmonary system hence chronic nasal dysfunction can contribute significantly to lower respiratory diseases such as asthma and chronic bronchitis.

The present study is an observational and comparative study including a total of 52 subjects with 25 healthy controls and 27 patients of CRS whose pulmonary function tests were evaluated with the objective to evaluate and compare the pulmonary function among the two groups. There have been quite a few studies demonstrating association of upper airway diseases with asthma and other lower airway conditions in past[8] but to the best of our knowledge this is one of the first study done in the Himalayan state of Himachal Pradesh to study the association of lower airway involvement in CRS.

Out of 27 CRS patients maximum number of patients n = 27 (55.6%) belonged to the age group of 41-60 years with mean age of 40.59 years. Similarly Sokol in a 2000 study[9] evaluated 16,000 patients suffering from CRS and found the mean age of patients comparable i.e 44 years.

In our present study majority of patients were male with n = 17 (63%) whereas females constituting 37% with n = 10. With a male to female ratio of 1.7:1. This is in accordance with a similar study done by Ahmed M Youssef[10] in 2017 on 25 patients with CRS in which male constituted a majority 60% (n = 15). Another Indian study conducted by Ziauddin Ahmed[11] in 2017 found a male preponderance 32 out of a total of 48 with males constituting 66.6% of the total cases.

##### a) Pulmonary function tests

Our study found that CRS patients had significantly poorer pulmonary functions compared to healthy controls. Similarly results of a 2004 study by

Ragab A et al[12] showed that 60% of patients with CRS had different kinds of lower airway involvement. Some are manifest such as asthma and some are hidden such as small airway disease and bronchial hyper-reactivity.

Our study found significant differences in pulmonary functions of healthy controls and the patients suffering from CRS. A total of 17 patients (63.9%) out of 27 having deranged pulmonary functions. with n = 10 (37%) of patients having mild pulmonary obstruction and n = 7 (25.9%) of patients having moderate pulmonary obstruction. Whereas compared to control group where only 2 patients (8%) out of a total of 25 had deranged pulmonary function test with n = 1 patient (4%) having mild and n = 1 (4%) having moderate obstruction. The mean vital capacity in patients group was 2.60 litres (74.59%) as compared to the mean vital capacity in the control group which was 3.07 l (82.80%). This difference was statistically significant with a p value of 0.018. The mean FVC in patients group was 2.75 litres (81.15%) whereas in controls it was 3.23 litres (90.08%) this difference was also statistically significant with a p value of 0.03. The mean FEV<sub>1</sub> in patients group was 2.08 litres (72.89%) whereas in control group the mean FEV<sub>1</sub> was 2.63 (84.80%) the difference between patients and controls was highly significant statistically with a p value of 0.02. The mean FEV<sub>1</sub>/FVC ratio in the patients group was 0.73(90.19%) as compared to control group which had a mean of 1.28(97.12%). Table 11,12,13,14. Findings of our present study matched the findings of a study done by Kariya S et al[13] in 2014 to evaluate the pulmonary function of 273 patients with CRS and 100 age-matched normal control subjects. CRS patients had significant obstructive lung function changes regardless of the presence of asthma. Similar results were observed in a retrospective study done on 284 subjects by Suh Young Lee et al[14] in 2010 to evaluate the influence of chronic sinusitis and nasal polyp on the lower airway of subjects without lower airway diseases. This study provided evidence that the presence of CT findings suggestive of chronic sinusitis is associated with a subclinical airflow limitation in subjects without lower respiratory disease. A unified airway disease hypothesis[15] may be valid for subjects even without definite lung disease.

The results of our study showed that majority of the patients had deranged pulmonary functions even if they had not been diagnosed with an overt lower airway disease these results are in accordance with the results of a study done by Gottlieb MJ[16] in 1925 on 117 cases of asthma, found that in all there were 31 cases of disease in one or more of the paranasal sinuses, a correlation was found between lower airway and upper airway diseases.

This nonsymptomatic lower airway involvement in patients with CRS can be explained by the small lower airway dysfunction that involves the terminal and respiratory bronchioles. Another entity of lower airway

functional involvement is the inflammation of the lower airways resulting in bronchial hyperreactivity[17][18]. Nasal obstruction can induce a blockage of the sinus ostia, with a reduction in the availability of nitric oxide in the upper and lower airways, as reported for patients with chronic sinus disease[19].

## V. CONCLUSION

Coexistence of upper and lower respiratory diseases is common. Our study found a significant derangement in the pulmonary functions of patients with CRS not previously diagnosed with any lower airway diseases. A united airway disease hypothesis may thus be valid. How exactly the upper airway disease effects lower airway is still a matter a of debate and beyond the scope of present study. However several hypotheses exist, like nasopharyngo bronchial reflexes that may lead

to airway hyper responsiveness. Also sinonasal mucosal inflammation may lead to pulmonary inflammation by releasing chemotactic factors and leukocytes. Oral breathing caused by CRS may also lead to inhalation of cold dry air and environmental pollutions bypassing the protective nasal function. Although our study is limited by a relatively small number of patients with most of the patients having the disease since many months if not years, our comparative study, with its well-defined outcome and criteria included for patient selection, helps to clarify the true value of lower airway assessment in these difficult-to-treat patients and to emphasize that the underuse of objective testing, such as spirometry for patients with CRS may lead to underdiagnosed lower airway problems.

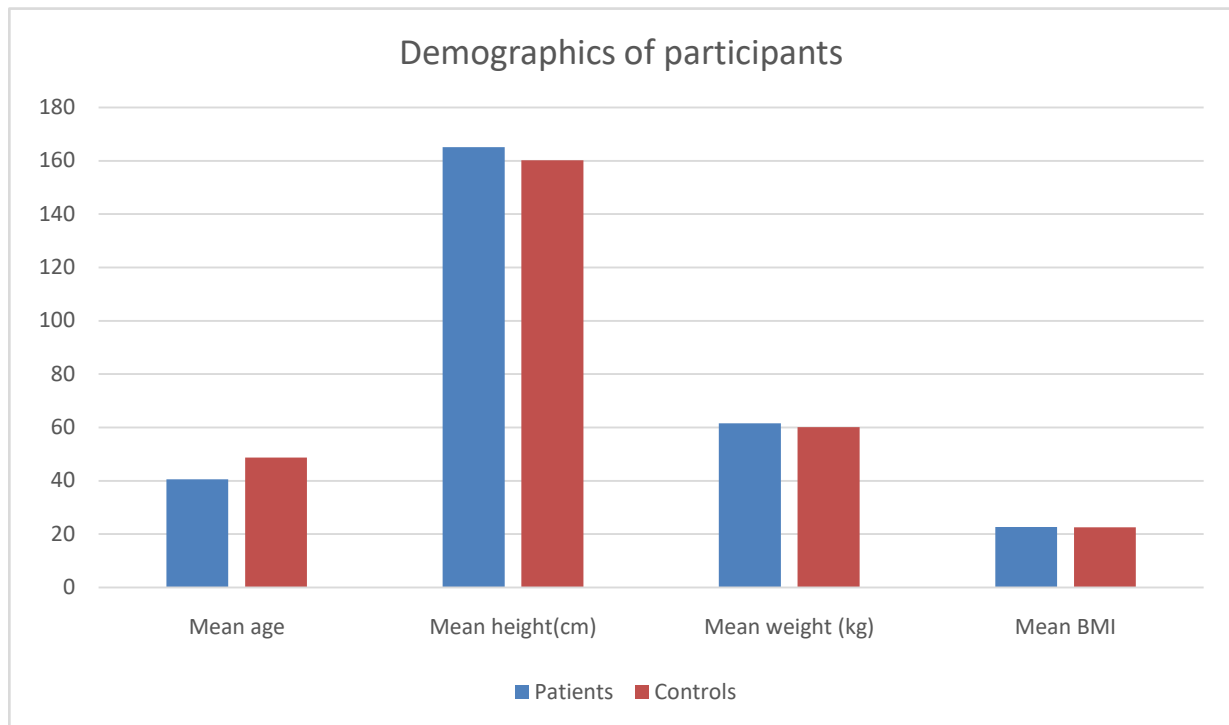


Figure 1: Demographic data of participants

## Comparison of PFT values among participants

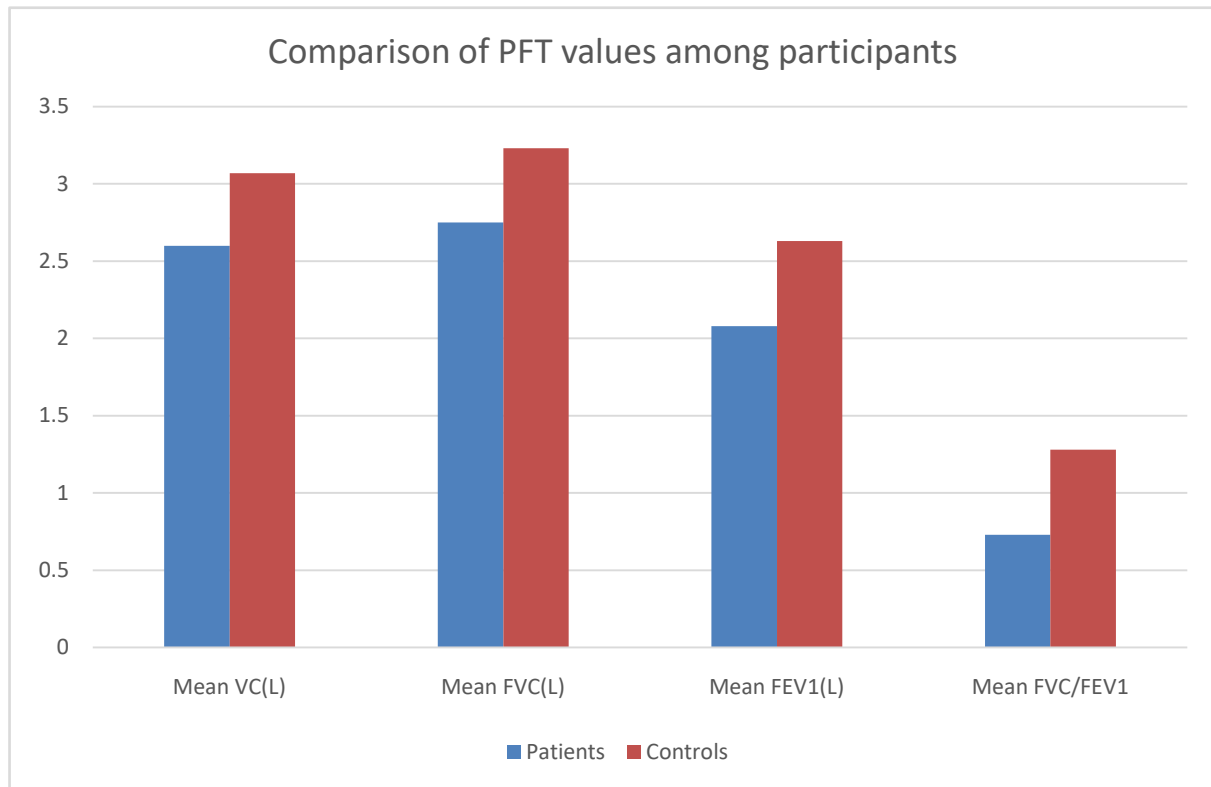


Figure 2: PFT comparison between patients and controls

## BIBLIOGRAPHY

1. International Rhinosinusitis Advisory Board. Infectious rhinosinusitis in adults: classification, etiology and management. *Ear Nose Throat J*. 1997; 76:1-22.
2. Bachert C, Vignola AM, Gevaert P, Leynaert B, Cauwenberge PV, Bousquet J. Allergic rhinitis, rhinosinusitis, and asthma: one airway disease. *Immunology and Allergy Clinics of North America*. 2004; 24(1): 19-43.
3. Kariya S, Okano M, Oto T, Higaki T, Makihara S, Haruna T, et al. Pulmonary function in patients with chronic rhinosinusitis and allergic rhinitis. *The Journal of Laryngology & Otology*. 2014; 128(3): 255-62.
4. Chien C-Y, Tai S-Y, Wang L-F, Lee CT-C. Chronic Obstructive Pulmonary Disease Predicts Chronic Rhinosinusitis without Nasal Polyps: A Population-Based Study. *American Journal of Rhinology & Allergy*. 2015; 29(3).
5. Vogelmeier C, Criner G, Martinez F, Anzueto A, Barnes P, Bourbeau J et al. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease 2017 Report. GOLD Executive Summary. *American Journal of Respiratory and Critical Care Medicine*. 2017; 195(5): 557-582.
6. Armstrong GL, Pinner RW. Outpatient Visits for Infectious Diseases in the United States, 1980 Through 1996. *Archives of Internal Medicine*. 1999; 159(21): 2531.
7. Borum P. Functional Anatomy and Physiology of the Nose. *Ear, Nose & Throat Journal*. 1992; 71(1):8-10.
8. Bullen SS. Incidence of asthma in 400 cases of chronic sinusitis. *Journal of Allergy*. 1933; 4(5): 402-7.
9. Sokol W. Epidemiology of sinusitis in the primary care setting: results from the 1999-2000 respiratory surveillance program. *The American Journal of Medicine*. 2001;111(9):1
10. Youssef AM, Awad OGA-N, Taha M. Pulmonary Function of Patients with Chronic Rhinosinusitis and the Impact of Endoscopic Sinus Surgery. *OTO Open*. 2017; 1(4).
11. Ahmad Z. The Effect of Functional Endoscopic Sinus Surgery on Pulmonary Functions of Patients with Pulmonary Diseases and Sinusitis. *Ann. Int. Med. Den. Res*. 2018; 4(6): EN05-EN09.
12. Ragab A, Clement P, Vincken W. Objective Assessment of Lower Airway Involvement in Chronic Rhinosinusitis. *American Journal of Rhinology*. 2004; 18(1): 1
13. Kariya S, Okano M, Higaki T, Noyama Y, Haruna T, Ishihara H et al. Chronic rhinosinusitis patients have decreased lung function. *International Forum of Allergy & Rhinology*. 2014; 4(10): 828-833.
14. Lee S, Yoon S, Song W, Lee S, Kang H, Kim S et al. Influence of Chronic Sinusitis and Nasal Polyp on the Lower Airway of Subjects Without Lower Airway

- Diseases. Allergy, Asthma & Immunology Research. 2014; 6(4): 31.
15. Passalacqua G. United airways disease: therapeutic aspects. Thorax. 2000Jan; 55(90002).
  16. Gottlieb MJ. Relation of Intranasal Disease in the Production of Bronchial Asthma. Journal of the American Medical Association. 1925Nov; 85(2):105.
  17. Hurst JR, Wilkinson TMA, Perera WR, Donaldson GC, Wedzicha JA. Relationships among Bacteria, Upper Airway, Lower Airway, and Systemic Inflammation in COPD. Chest. 2005; 127(4): 1219–26.
  18. Karuthedath S, Singh I, Chadha S. Impact of Functional Endoscopic Sinus Surgery on the Pulmonary Function of Patients with Chronic Rhinosinusitis: A Prospective Study. Indian Journal of Otolaryngology and Head & Neck Surgery. 2014Aug; 66(4): 441–8.
  19. Frendø, M, Håkansson, K, Schwer, S. Asthma in ear, nose, and throat primary care patients with chronic rhinosinusitis with nasal polyps. Am J Rhinol Allergy. 2016; 30: 67-71.

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## The Assessment of Prone Position in Severe Acute Respiratory Syndrome

By Vitória F. Silva, Agustin M. R. de Lima & Roberta M. Amaral

**Abstract- Introduction:** Acute respiratory distress syndrome (ARDS) is a frequent condition associated with high mortality, acute alveolar damage, loss of lung compliance and hypoxemia. The prone position has been used to improve oxygenation in patients with moderate to severe hypoxemia with  $\text{PaO}_2/\text{FiO}_2 < 150$ , with this maneuver the lung compliance increases, associated with more homogeneous lung expansion and better gas exchange.

**Aims: Primary:** To evaluate the effectiveness of the prone position in patients with acute respiratory distress syndrome. **Secondary:** Understand the respiratory physiology involved in the use of prone position in patients with acute respiratory distress syndrome.

**Methods:** This work is a narrative review of literature in the Google academic, Scientific Electronic Library Online (Scielo), Medline and Cochrane databases, 22 articles were selected between 2001 and 2020. The keywords used were “prone position”, “respiratory distress syndrome” and “acute lung injury”.

**Keywords:** “prone position”, “acute respiratory distress syndrome” e “acute lung injury”.

**GJMR-F Classification:** NLMC Code: WF 140



Strictly as per the compliance and regulations of:



# The Assessment of Prone Position in Severe Acute Respiratory Syndrome

Avaliação Da Posição Prona Na Síndrome Do Desconforto Respiratório Agudo

Vitória F. Silva <sup>α</sup>, Agustin M. R. de Lima <sup>ο</sup> & Roberta M. Amaral <sup>ρ</sup>

**Resumo- Introdução:** A síndrome do desconforto respiratório agudo (SDRA) é uma condição frequente associada à alta mortalidade, dano alveolar agudo, perda da complacência pulmonar e hipoxemia. A posição prona tem sido utilizada para melhorar a oxigenação em pacientes com hipoxemia moderada a severa com  $PaO_2/FiO_2 < 150$ ; com essa manobra a complacência pulmonar aumenta, associado a uma expansão pulmonar mais homogênea e melhor troca gasosa.

**Objetivos:** *Primário:* Avaliar a eficácia da posição prona em pacientes com síndrome do desconforto respiratório agudo. *Secundário:* Entender a fisiologia respiratória envolvida na utilização da posição prona em pacientes com síndrome do desconforto respiratório agudo.

**Métodos:** este trabalho é uma revisão narrativa de literatura nas bases de dados Scientific Eletronic Library Online (Scielo), Medline e Cochrane, foram selecionados 22 artigos no período entre 2001 e 2020. Os descritores utilizados foram "decúbito ventral", "síndrome do desconforto respiratório" e "lesão pulmonar aguda".

**Resultados:** A posição prona contribui para a melhora da oxigenação dos pacientes com síndrome do desconforto respiratório grave em geral por uma diminuição dos efeitos de compressão que favorecem o colapso alveolar, promovendo melhor recrutamento das regiões dorsais do pulmão e uma ventilação mais homogênea. Estudos randomizados e metanálises trouxeram informações benéficas em termos de redução de mortalidade.

**Conclusões:** O tratamento da SDRA varia em função da doença de base do paciente e do seu estado hemodinâmico. Estudos controlados e randomizados e metanálises confirmaram que a posição prona melhora a oxigenação nesses pacientes.

**Descritores:** "decúbito ventral", "síndrome do desconforto respiratório agudo" e "lesão pulmonar aguda".

**Abstract- Introduction:** Acute respiratory distress syndrome (ARDS) is a frequent condition associated with high mortality, acute alveolar damage, loss of lung compliance and hypoxemia. The prone position has been used to improve oxygenation in patients with moderate to severe hypoxemia with  $PaO_2/FiO_2 < 150$ , with this maneuver the lung compliance increases, associated with more homogeneous lung expansion and better gas exchange.

**Aims: Primary:** To evaluate the effectiveness of the prone position in patients with acute respiratory distress syndrome. *Secondary:* Understand the respiratory physiology involved in the use of prone position in patients with acute respiratory distress syndrome.

**Methods:** This work is a narrative review of literature in the Google academic, Scientific Electronic Library Online (Scielo), Medline and Cochrane databases, 22 articles were selected between 2001 and 2020. The keywords used were "prone position", "respiratory distress syndrome" and "acute lung injury".

**Results:** The prone position contributes to the improvement of oxygenation in patients with severe respiratory distress syndrome in general by decreasing the compression effects that favor alveolar collapse, promoting better recruitment of the dorsal regions of the lung and more homogeneous ventilation. Randomized studies and meta-analyses provided beneficial information in terms of reduced mortality.

**Conclusions:** The treatment of ARDS varies according to the patient's underlying disease and hemodynamic status. Controlled, randomized studies and meta-analyses have confirmed that the prone position improves oxygenation in these patients.

**Keywords:** "prone position", "acute respiratory distress syndrome" e "acute lung injury".

## 1. INTRODUCTION

Acute respiratory distress syndrome (ARDS) is a common condition with high mortality rates in patients in critical state and it is related with acute alveolar damage, loss of lung compliance and hypoxemia<sup>1</sup>.

For many years, prone position has been used to improve oxygenation in patients with ARDS that need mechanical ventilation support, being recommended to patients with moderate to severe hypoxemia with  $PaO_2/FiO_2 < 150$ <sup>2</sup>.

The improvement of oxygenation associated with prone position is related to the decrease of aspects that contribute to alveolar collapse, alveolar ventilation redistribution and perfusion. There is a reduction in pulmonary stress and tension, reducing over distension of non-dependent aerated zones and recruit dependent and atelectasis zones. Lung compliance increases, but with a decrease of the rib cage compliance associated to a more homogenous lung expansion and better rates of ventilation/perfusion<sup>2</sup>.

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The prone position is a maneuver that can be used on patients with acute respiratory distress syndrome aiming to diminish hypoxemia, was used for many years in the management of this disease. Prospective randomized studies and meta-analyses have increased the evaluation of the scientific evidence of the use of the prone position connected to the reduction of mortality rates, its efficiency as well as the necessary time to accomplish the adequate ventilatory parameters.<sup>3</sup>

## II. AIMS

*Primary:* Evaluate the efficiency of the use of the prone position in patients with acute respiratory distress syndrome.

*Secondary:* Understand the respiratory physiology involved in the use of the prone position in patients with acute respiratory distress syndrome.

## III. METHODS

This work was elaborated through a revision of the literary narrative present on the Scientific Eletronic Library Online (Scielo), Medline e Cochrane databases. Twenty-two articles published between 2001 and 2020 were selected to this endeavor. The descriptors used for this were “decúbito ventral”, “síndrome do desconforto respiratório” and “lesão pulmonar aguda” in Portuguese and its English translations “prone position”, “respiratory distress syndrome” and “acute lung injury”, found on “Medical Subject Headings- MeSH” list.

Through the research methods used, there were no studies that approached the efficiency of this conduct on acute respiratory distress syndrome in mild cases, including nevertheless, moderate to severe cases in the twenty-two articles mentioned.

The criteria used in this research included articles both in English and Portuguese, with the complete text provided online excluding articles published before 2001, thesis, chapters of thesis, seminary and conference proceedings.

To measure outcomes in the use of the prone position maneuver in patients with acute respiratory distress syndrome, variables like mortality were evaluated, following studies and metanalyses through statistic parameters, like risk motive, trust interval and p value.

## IV. RESULTS AND DISCUSSION

Acute respiratory distress syndrome is a potentially devastating form of hypoxemic respiratory insufficiency caused by acute inflammatory lung affection. It is marked by a sudden beginning and by the presence of triggering factors (bilateral diffuse pulmonary infiltrate), that generally constitute a non-cardiogenic pulmonary edema<sup>4</sup>.

Even though the clinical significance of acute respiratory syndrome is undeniable, its global prevalence is uncertain. Approximately 10-20% of hospitalized patients on mechanical ventilation fit the diagnosed criteria for ARDS<sup>4</sup>.

ARDS was defined in 1994 by the American-European Consensus Conference, and since then questions about this definition reliability and validity have been raised. In 2012, a new model of diagnosis, known as the Berlin Definition, was proposed, being divided in three categories mutually exclusive based on its degree of hypoxemia: mild ( $200 \text{ mm Hg} < \text{PaO}_2/\text{FIO}_2 \leq 300 \text{ mm Hg}$ ), moderate ( $100 \text{ mm Hg} < \text{PaO}_2/\text{FIO}_2 \leq 200 \text{ mm Hg}$ ) and severe ( $\text{PaO}_2/\text{FIO}_2 \leq 100 \text{ mm Hg}$ ), starting seven days after a known clinical insult or worsened respiratory symptoms, besides consistent bilateral opacities with pulmonary edema visible through chest X-rays or CT scans<sup>5</sup>.

To validate the criteria, it's necessary that the minimal PEEP or CPAP configuration be 5 cm of water and that the relation  $\text{Pao}_2/\text{Fio}_2$  is evaluated in patients with invasive mechanical ventilation (with the CPAP criteria being used to diagnose mild cases of ARDS)<sup>5</sup>.

As recognized by the Berlin definition, the development of ARDS is second to insults, that are mainly classified as pulmonary or systemic (indirect) factors of origin. Pneumonia (bacterial, viral, fungal, or opportunistic), aspiration of gastric contents and non-pulmonary focus sepsis together represent more than 85% of cases of ARDS<sup>6</sup>.

It is important to acknowledge that the acute respiratory distress syndrome is not a disease, but a syndrome characterized by many causes and by a great variety of clinical trajectories, with a physiopathology that can be divided into 3 sequential phases that overlap: exudative or inflammation phase, proliferative phase, and fibrous phase. In matters of histology, after the beginning of the primary disease, a diffuse lesion occurs, marked by innate immunity cells of the alveolar endothelium and epithelial barriers, with a flood of protein-rich plasma and cellular content in the interstitium and air space, occurring a rapid development of capillary congestion, the appearance of atelectasis, hemorrhage and alveolar edema, followed days later by the formation of a hyaline membrane, epithelial cell hyperplasia and interstitial edema<sup>6</sup>.

Considering the relevance of ARDS in a context of intensive therapy, clinical diagnosis and the early adoption of therapeutic strategies (specially the use of protective ventilation) are determinant for the reduction of morbidity and the increase of patient survival rate<sup>1</sup>. The treatment for acute respiratory insufficiency is destined to the underlining disease, as well as a package of interventions destined to improve lung gas exchange, limiting secondary pulmonary lesion, with mechanical ventilation. In the initial phase of the mild respiratory insufficiency, non-invasive ventilation can be

used to prevent orotracheal intubation and subsequent pulmonary lesions associated with mechanical ventilation<sup>7</sup>.

Prone position has been used for more than 30 years as treatment to patients with acute respiratory distress syndrome. This maneuver has shown that is capable to improve the oxygenation in patients with acute respiratory insufficiency. Studies done through metanalyses suggest that the use of the prone position is best used in patients on the subgroup with severe hypoxemia<sup>8,9</sup>.

Randomized studies confirm that prone position increases oxygenation when compared to the supine position, being recommended to patients with moderate to severe hypoxemia with  $\text{PaO}_2/\text{FiO}_2 < 150$ . The reasons behind the improvement on oxygenation are not completely defined and different potential mechanisms were identified<sup>3,10-13</sup>.

Several clinical randomized studies investigate the evaluation of the use of prone position in patients

with acute respiratory distress syndrome, observing the number of patients, duration of the trial, observed criteria, last follow-up evaluation and duration of the use of diverse maneuvers (TABLE 01).

To comprehend the respiratory physiology involved in the improvement of oxygenation during the use of the prone position, is fundamental to understand and recognize the importance of respiratory physiology, correlating with lung's West zone and alveolar pressure, of pulmonary arteries and veins (IMAGE 01).

West zone 1 correspond to the pulmonary peek, when alveolar pressure is higher than the pressure on the pulmonary artery, that in turn is higher than the pressure in the pulmonary vein. In this case, because the alveolar pressure is higher than the pressure on pulmonary vessels, the blood flow decreases in this pulmonary region. Being a ventilated area, but not well perfused, it impairs gas exchange there<sup>18</sup>.

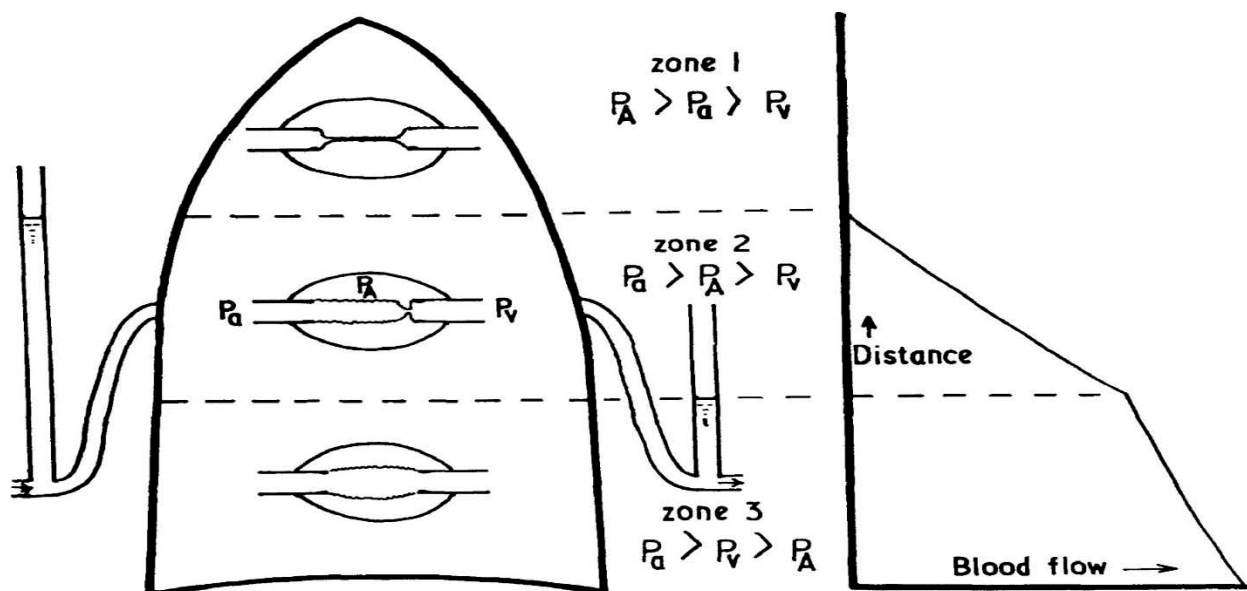
**Table 01:** Characteristics of the randomized clinical studies that investigate the use of prone position in patients with acute respiratory distress syndrome

	Prone – supine I 2001 <sup>14</sup>	Guérin C et al 2004 <sup>15</sup>	Mancebo J et al 2006 <sup>16</sup>	Prone- supine II 2009 <sup>17</sup>	Guérin C et al 2013 <sup>3</sup>
Number of patients	304	791	136	342	466
Years evaluated	1996-1999	1998-2002	1998-2002	2004-2008	2008-2011
Criteria	ALI/ARDS with PEEP higher or equal to 5 cm of H <sub>2</sub> O	Acute respiratory failure	ARDS with 4 cuffing quadrants observed in X-ray	ALI/ARDS with PEEP higher or equal to 5 cm of H <sub>2</sub> O	ARDS with $\text{PaO}_2/\text{FiO}_2$ < 150 with $\text{FiO}_2$ higher of equal to 0,6 and PEEP higher or equal to 5 cm of H <sub>2</sub> O
Last follow-up evaluation	Upto 6 months	Upto 3 months	Until Hospital discharge	Upto 6 months	Upto 3 months
Maneuver duration	7 hours for 4,7 days	9 hours for 4,1 days	17 hours for 10,1 days	18 hours for 8,3 days	For at least 16 hours

ALI: Acute lung injury; ARDS: Acute respiratory distress syndrome; PEEP: Positive expiratory pressure at the end of expiration. Adapted from Gattinoni L.<sup>9</sup>

Lower, in the lung (zone 2) the arterial pressure increases because of the hydrostatic effect and now exceeds the alveolar pressure. Nevertheless, venous pressure is still very low, lower than the alveolar pressure. Under these conditions, blood flow is determined by the difference between alveolar and arterial pressure. Once the arterial pressure is increasing towards the bases, and the arterial pressure is the same for the whole lung, the difference in pressure is responsible for the increase of flow<sup>18</sup>.

On zone 3, venous pressure exceeds alveolar pressure, and the flow is determined by the difference between the pressure on the pulmonary arteries and veins. Besides the growing of capillary recruitment, the increase of blood flow can be produced by capillary distension<sup>18</sup>.



**Image 01:** Lung's West zones and their correlation to alveolar, arterial and venous pulmonary pressure.

PA: Alveolar pressure; Pa: Arterial pulmonary pressure; Pv: Venous pulmonary pressure. Source: Levitzky MG.<sup>18</sup>

Various mechanisms can explain the respiratory physiology involved in the improvement of oxygenation with the use of prone position, like a homogenous alveolar distribution, reducing pulmonary tension and stress associated with mechanical ventilation, as well as the recruitment of zone with atelectasis, promoting a better recruitment of pulmonary dorsal regions related to ventral regions of the lung. So, pulmonary ventilation is more homogenous with better ratio of perfusion ventilation, improving gas exchange and preventing pulmonary lesion provoked by mechanical ventilation<sup>2</sup>.

Prone position contributes to an improvement of oxygenation in patients with severe respiratory distress syndrome in general due to the decrease of compression effects that favor alveolar collapse. Since the physiopathology of the disease is uniform throughout the lung, the edema is responsible for the increase of the weight of the lung, which associated with gravity, makes that the dependent regions collapse. The region that collapses the most, is the dorsal one. When the patient is put on prone position, the dorsal region does not suffer from the weight of the lung, becoming more expanded<sup>9</sup>.

Prone position enhances respiratory mechanics, through the improvement of the inspiratory kinetics, probably preventing the closing of smaller air ways before the final exhale<sup>9</sup>.

In normal individuals, the weight of the heart influences aeration of lungs' dependent regions, facilitating its collapse. On patients with ARDS, this effect can be aggravated by pulmonary hypertension that results from hypoxic vasoconstriction, releasing vasoconstrictive substances and remodeling pulmonary circulation, in addition to an enlargement of the right cardiac chamber. The improvement of the mechanics with the use of the prone position can result in the relief

of cardiac and abdominal compression made by the lower lobes on the supine position<sup>19</sup>.

The compliance of the pulmonary system can increase, even though the thoracic wall compliance diminishes. Besides that, the driving pressure of the respiratory system (plateau pressure – PEEP) increased from the supine position to the prone one, and the augmentation of the directed pressure of the respiratory system was due to a growth of the elastance of the thoracic wall<sup>19</sup>.

However, in addition to the inherent benefits of the prone maneuver on the patient, we have the risks associated with the formation of pressure ulcers, obstruction of the orotracheal tube and dislocation of the tube<sup>3</sup>.

Two metanalyses and the PROSEVA study showed the beneficial effects on patients with moderate to severe acute respiratory distress syndrome with a decrease of mortality. Nonetheless the duration of the session remains unknown, being necessary additional research to a better understanding of the total time needed for this maneuver. While on the PROSEVA study, patients remained in position for about 17 hours, on both metanalyses, time ranged from 7 to 18 hours<sup>3,8,9</sup>.

A cohort study analyzed arterial blood gases, pulmonary mechanics and capnography during the first prone position session. The results generally showed a significant increase of pH, static compliance and PaO<sub>2</sub>/FiO<sub>2</sub> and a significant decrease of PaCO<sub>2</sub>, plateau pressure and pressure variation. Since it's a study mainly based on observations, it needs to be evaluated with care, since the absence of randomization may lead to a biased result. Nevertheless, it brings us an idea of the parameters that can be altered using this maneuver<sup>2</sup>.

Analyzing the PROSEVA study, multicentric, prospective, controlled, and randomized, we obtained a study that aimed to evaluate the early use of prone position in patients with ARDS, randomizing 466 patients with  $\text{PaO}_2/\text{FiO}_2 < 150$  mmHg,  $\text{FiO}_2$  higher or equal to 0,6 and PEEP higher or equal to 5cmH<sub>2</sub>O<sup>3</sup>.

237 patients were subjected to the prone position and 299 subjected to the supine position. Taking into account the mortality in the first 28 days, the results showed a percentage of 16% of the prone position vs 32.8% of the supine position (HR 0,39; IC de 95%; 0,25-0,63;  $p < 0,001$ ) and until the ninetieth day, 23,6% in patients in prone position vs 41% in supine position (HR 0,44; IC de 95%; 0,29-0,67;  $p < 0,001$ ). This strongly suggest that in patients with severe ARDS, the early usage of prolonged prone position sessions lead to a significant diminish in mortality on days 28 and 90<sup>3</sup>.

The criteria to interrupt the treatment were: improvement on oxygenation  $\text{PaO}_2/\text{FiO}_2$  of  $\geq 150$  mm Hg, with a PEEP of  $\leq 10$  cm of water and a  $\text{FiO}_2$  of  $\leq 0,6$ , these criteria had to be attended on the supine position at least 4 hours after the end of the last prone position session; a decrease on  $\text{PaO}_2/\text{FiO}_2$  in more than 20%, in relation to the supine position, before the two consecutive sessions in prone; or complications that occurred during the maneuver leading to its immediate interruption<sup>3</sup>.

The complications that involved an immediate interruption of the treatment in prone involved the nonscheduled extubation, obstruction of the orotracheal tube, less than 85% of oxygen saturation on pulse oximetry or  $\text{PaO}_2$  lower than 55mmHg for more than 5 minutes when the  $\text{FiO}_2$  were 1,0, cardiac arrest, cardiac frequency lower than 30 beats per minute for more than one minute, systolic arterial pressure lower than 60mmHg for more than 5 minutes and any other motive associated with a risk on life that lead the doctor to interrupt the treatment<sup>3</sup>.

Hemodynamic compromise, a frequent condition associated with ARDS, does not represent, on its own, a contraindication to the use of the prone position. In the PROSEVA study, that showed the beneficial effect on survival rate, 72% of patients received vasopressors, with a result not so different from that noticed on the control group<sup>3</sup>.

But all patients were hemodynamically stable when they were included on the study, since their average arterial pressure had to be  $\geq 65$  mmHg, or they would be excluded from the study. It is fundamental to emphasize that the prone position, when properly used, doesn't induce hemodynamics side effects, and can even improve hemodynamics<sup>3</sup>.

Even with an extensive literature about the handling of ARDS, COVID-19 constitutes a new viral infection of the lower respiratory tract, in which the physiopathology and treatment are not completely extended. The CT scan of these patients bring new and

interesting information about the physiopathology and individualization of the mechanical ventilation, taking into account different phenotypes of the disease<sup>20</sup>.

Accordingly to the CT scans, there were 3 different phenotypes, with phenotype 1 being multiple, focal findings, ground-glass opacities in the subpleural region; phenotype 2 atelectasis and non-homogeneously distributed peribronchial opacities and phenotype 3 with ARDS-like pattern.<sup>20</sup>

In phenotype 1, pulmonary compliance was normal or even high, but with severe hypoxemia. Moderate PEEP can be used to redistribute the pulmonary flow and reduce the shunt. In this case, using the principles generally used for ARDS, and choosing the PEEP accordingly to a better driving pressure, lower PEEP can be used in case of normal compliance. Prone position may redistribute perfusion but is generally not very useful in this stage<sup>20</sup>.

In the phenotype 2, atelectasis is prevailing. In this case, moderate and high PEEP may be used, with or without the use of the prone position to recruit areas not aerated of the lung<sup>20</sup>.

In the phenotype 3, typical findings of moderate to severe ARDS, with alveolar edema and low pulmonary compliance were observed. Respiratory parameters must follow the same principles applied to ARDS, with the PEEP chosen accordingly to a better driving pressure, beyond the use of prone position and oxygenation trough the extracorporeal membrane (ECMO), if necessary<sup>20</sup>.

When hypoxemia and respiratory insufficiency persist or get worse after the use of oxygen, or in case of persistent hypercapnia, organic failure, coma, aspiration risk, or hemodynamic instability; the mechanical ventilation must be used as soon as possible<sup>20</sup>.

Hypoxemic respiratory insufficiency and the need for invasive ventilation must be considered when patients are under oxygen, but who show tachypnea ( $> 30$  bpm) and hypoxemia ( $\text{SatO}_2 < 90\%$  or  $\text{PaO}_2 < 60$  mmHg), even with oxygen being administered through facial mask or reservoir bag with 10-15 L/min<sup>20</sup>.

In the current pandemic caused by the coronavirus (COVID-19), the prone position has been largely adopted by doctors and even used before intubation in patients that breath spontaneously<sup>21</sup>.

Patients with ARDS related to COVID-19 were included in a multicentric cohort study in Spain<sup>22</sup>, with 63% of patients with mild cases. Studies currently in progress indicate that the action mechanisms for pneumonia caused by COVID-19 (e.g., blood flow redistribution) may be different from other forms of ARDS, indicating that not all COVID patients intubated are benefited by the use of this maneuver<sup>21</sup>.

The use of prone position in patients not intubated and with spontaneous breathing was propelled by the COVID-19 pandemic. Up to this day,

the results of studies, done through observation, about the viability and efficiency of this strategy on the oxygenation before intubating, in patients that received high flow of oxygen or noninvasive ventilation are inconclusive. New studies are necessary to verify if this strategy can reduce the intubation rate and improve the survival numbers<sup>21</sup>.

Is fundamental to integrate the prone position with protective ventilation in patients with moderate to severe acute respiratory distress syndrome. It is not possible, though, to foresee which patients will have a real benefit with the use of prone position before, during and even after the maneuver. Studies are still needed to evaluate the pronation in patients with mild to moderate respiratory distress and on non-intubated patients, as well as to evaluate the proper duration of its use to improve oxygenation on patients<sup>2</sup>.

## V. CONCLUSIONS

Taken into account the collected data, we can conclude that the acute respiratory distress syndrome is a form of acute hypoxemic respiratory insufficiency, marked by an acute inflammatory process in the lung. The treatment for this condition varies accordingly to the base illness of the patient and his hemodynamic state. Patients with moderate to severe respiratory distress, with  $\text{PaO}_2/\text{FiO}_2 < 150$ , have the therapeutic alternative of the use of the prone position, to improve their oxygenation.

The respiratory physiology involves the improvement of the oxygenation related to the decrease of pulmonary stress, pulmonary lesion induced by ventilation, with a more homogenous pulmonary expansion, improving ventilation parameters, as well as gas exchange. In this sense we achieve the secondary aim of this article.

We can conclude that various randomized clinical studies and meta-analyses suggested the improvement of oxygenation on patients when they were subjected to the prone position, where primarily made in an early stage and in relative long sessions. We also attested an improvement on the mortality rates of these patients, with a highlight to the PROSEVA study that comparatively analyzed the mortality on days 28 and 90. The efficiency of the maneuver questioned in the primary aim of this article was also answered using scientific evidence and randomized studies as basis.

In the current pandemic of COVID-19, the use of the prone position has been extended to non-intubated patients, aiming the improvement of oxygenation, but more studies are still needed to evaluate if it can reduce the need for intubation and improve the survival rates.

With that, we path our way to a conclusive understanding that more studies are necessary to comprehend the use of the prone position to patients with moderate to mild respiratory distress, since the

studies done up to now only prove the benefits for patients with moderate to severe cases, which limit our study. It's also fundamental to analyze the ideal duration of the maneuver to improve oxygenation and its ventilatory parameters.

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## REFERENCES RÉFÉRENCES REFERENCIAS

1. Dalmedico MM, Salas D, Oliveira AM, Baran FD, Meardi JT, Santos M. C. Efficacy of prone position in acute respiratory distress syndrome: overview of systematic reviews. *Rev Esc Enf USP*. 2017; 51.
2. Sebastien J, Sandie M, Chelly J, Franck P, Mehran M, et al. Duration of prone position sessions: a prospective cohort study. *Annals of Intensive Care*. 2020; 10(1).
3. Guérin C, Reignier J, Richard JC, Beuret P, Gacouin A, Ayzac L, et al. Prone positioning in severe acute respiratory distress syndrome. *N Engl J Med*. 2013; 368(23), 2159-2168.
4. Thompson BT, Chambers RC, Liu, K D (2017). Acute respiratory distress syndrome. *N Engl J Med*. 2017; 377(6), 562-572.
5. Force AD, Ranieri VM, Rubenfeld GD, Thompson B, Ferguson N, Caldwell E. (2012). Acute respiratory distress syndrome. *Jama*. 2012; 307(23), 2526-2533.
6. Derwall M, Martin L, Rossaint R. The acute respiratory distress syndrome: pathophysiology, current clinical practice, and emerging therapies. *Expert review of respiratory medicine*. 2018; 12(12), 1021-1029.
7. Schettino GP, Reis MA, Galas F, Park M, Franca S, Okamoto V. Ventilação mecânica não invasiva com pressão positiva. *Jornal Bras de Pneumo*. 2007; 33, 92-105.
8. Sud S, Friedrich JO, Taccone P, Polli F, Adhikari NK, Gattinoni L, et al. Prone ventilation reduces mortality in patients with acute respiratory failure and severe hypoxemia: systematic review and meta-analysis. *Intensive care medicine*. 2010; 36(4), 585-599.
9. Gattinoni L, Carlesso E, Taccone P, Polli F, Guérin C, Mancebo J. Prone positioning improves survival in severe ARDS: a pathophysiologic review and individual patient meta-analysis. *Minerva anesthesiologica*. 2010; 76(6), 448-454.
10. Gattinoni L, Tognoni G, Pesenti A, Taccone P, Mascheroni, D, Latini R, et al. Effect of prone positioning on the survival of patients with acute

- respiratory failure. *N Engl J Med.* 2001; 345(8), 568-573.
11. Guérin C, Gaillard S, Lemasson S, Ayzac L, Girard R, Kaidomar M, et al. Effects of systematic prone positioning in hypoxemic acute respiratory failure: a randomized controlled trial. *Jama.* 2004; 292(19), 2379-2387.
  12. Mancebo J, Fernández R, Blanch L, Rialp G, Gordo F, Albert RK, et al. A multicenter trial of prolonged prone ventilation in severe acute respiratory distress syndrome. *Am J Respir Care Med.* 2006; 173(11), 1233-1239.
  13. Taccone P, Pesenti A, Latini R, Polli F, Vagginelli F, Mietto C, et al. Prone positioning in patients with moderate and severe acute respiratory distress syndrome: a randomized controlled trial. *Jama.* 2009; 302(18), 1977-1984.
  14. Gattinoni L, Tognoni G, Pesenti A, Taccone P, Mascheroni D, Labarta V et al. Effect of prone positioning on the survival of patients with acute respiratory failure. *N Engl J Med* 2001; 345: 568-73.
  15. Guérin C, Gaillard S, Lemasson S, Ayzac L, Girard R, Beuret P et al. Effects of systematic prone positioning in hypoxemic acute respiratory failure: a randomized controlled trial. *Jama.* 2004; 292: 2379-87.
  16. Mancebo J, Fernández R, Blanch L, Rialp G, Gordo F, Ferrer M, et al. A multicenter trial of prolonged prone ventilation in severe acute respiratory distress syndrome. *Am J Respir Crit Care Med.* 2006; 173: 1233-9.
  17. Taccone P, Pesenti A, Latini R, Polli F, Vagginelli F, Mietto C et al. Prone positioning in patients with moderate and severe acute respiratory distress syndrome: a randomized controlled trial. *Jama.* 2009; 302: 1977-84.
  18. Levitzky MG. Teaching the effects of gravity and intravascular and alveolar pressures on the distribution of pulmonary blood flow using a classic paper by West et al. *Advances in physiology education.* 2006; 30(1), 5-8.
  19. Paiva KC, Beppu OS. Posição prona. *J Bras de Pneumo.* 2005; 31(4), 332-340.
  20. RobbaC, Battaglini D, Ball L, Loconte M, Brunetti I, Pelosi, P, et al. Distinct phenotypes require distinct respiratory management strategies in severe COVID-19. *Respiratory physiology & neurobiology.* 2020; 103455.
  21. GuérinC, Albert RK, Beitler J, Gattinoni L, Jaber, S., ManceboJ, et al. Prone position in ARDS patients: why, when, how and for whom. *Int Care Med.* 2020; 1-12.
  22. Ferrando C, Suarez-Sipmann F, Mellado-Artigas R, Hernández M, Gea A, Villar J, et al. Clinical features, ventilatory management, and outcome of ARDS caused by COVID-19 are similar to other causes of ARDS. *Int Care Med.* 2020; 46(12), 2200-2211.





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## KID Syndrome Complicated by Multiple Abscesses of the Parietal Region Skin: Clinical Case

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**Abstract-** Keratitis-ichthyosis-deafness (KID) syndrome is an orphan genetic multisystem disease with autosomal recessive and dominant types of inheritance, which manifests in the neonatal period. The leading triad of symptoms is as follows: skin lesions, eye diseases, and ear pathology. Clinical Case Description. Girl V., 17 years old, with KID syndrome was hospitalized complaining of painful infiltrates of the parietal region. Multiple abscesses were lanced. Hyperkeratotic crusts were removed, unviable skin regions were excised, and abscesses' cavities were washed with an antiseptic solution during daily dressings. Purulent discharge from wounds maintained for seven days.

**Conclusion:** There is no pathogenetic treatment for KID syndrome yet. Prevention of secondary surgical infections remains crucial in the management of such patients. Local wound treatment and symptomatic and antibacterial therapy are effective in case of skin infection.

**Keywords:** KID syndrome, secondary infection, children, clinical case, abscess.

**GJMR-F Classification:** NLMC Code: WC 570



*Strictly as per the compliance and regulations of:*



# KID Syndrome Complicated by Multiple Abscesses of the Parietal Region Skin: Clinical Case

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**Abstract-** Keratitis-ichthyosis-deafness (KID) syndrome is an orphan genetic multisystem disease with autosomal recessive and dominant types of inheritance, which manifests in the neonatal period. The leading triad of symptoms is as follows: skin lesions, eye diseases, and ear pathology. Clinical Case Description. Girl V., 17 years old, with KID syndrome was hospitalized complaining of painful infiltrates of the parietal region. Multiple abscesses were lanced. Hyperkeratotic crusts were removed, unviable skin regions were excised, and abscesses' cavities were washed with an antiseptic solution during daily dressings. Purulent discharge from wounds maintained for seven days.

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## INTRODUCTION

Keratitis-ichthyosis-deafness (KID) syndrome is an orphan genetic multisystem disease with autosomal recessive (AP) and dominant types (DT) of inheritance, which manifests in the neonatal period.

With AR-type of inheritance, the disease is initiated by a homozygous or compound heterozygous mutation in the AP1B1 gene on chromosome 22q12, with AD inheritance by a heterozygous mutation in the connexin-26 gene (GJB2) on chromosome 13q12. The GJB2 gene encodes the structural protein connexin 26, which forms gap contacts connecting neighboring cells and allowing the exchange of small molecules and ions. Violation of this connection and exchange can affect intercellular communication in the skin and other tissues [1-3].

Burns first described a disorder with these symptoms in 1915, and Skinner et al. proposed KID as the term for this syndrome in 1981. Worldwide, only 100 cases have been described [4].

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**Author ¥:** National Medical Research Center for Obstetrics, Gynecology and Perinatology n.a. Academician V.I. Kulakov, Moscow, Russian Federation Background.

The main triad of symptoms is the following:

- Skin changes (hyperkeratosis, ectodermal dysplasia, tendency to secondary infections of various etiologies) usually on the palms, soles, and scalp;
- Eye diseases (vascularizing keratitis, corneal opacity, dry eyes, blepharitis, conjunctivitis, photophobia);
- Pathology of the hearing organs (sensorineural hearing loss, impaired conduction due to external or otitis media) [5-7].

Patients with KID syndrome are believed to be at an increased risk (12%) of developing squamous cell carcinoma of the skin, tongue, and buccal mucosa in childhood. The literature describes cases of squamous cell carcinoma of the cornea.

Patients with KID syndrome are susceptible to secondary infections because the skin barrier function is impaired, thus leading to the formation of erosions and penetration of bacterial or fungal infections. Excessive keratinization of the cellular epithelium (hyperkeratosis) causes blockages of the openings of the sweat and sebaceous glands [8], resulting in the development of purulent-inflammatory processes. Other features of KID syndrome may include:

- Sparse hair, or alopecia;
- The absence of nails or their unusual shape;
- Abnormal structure or shape of the teeth;
- Reduced sweating.

There is no specific treatment for this disease at the moment. All therapies are symptomatic and aimed at preventing and treating complications. Treatment of skin lesions is mainly conservative, including emollients and keratolytic. Due to ichthyosis, infection is highly likely, making the treatment of such wounds more difficult [9, 10].

Existing literature suggests treating the secondary infection with hydrosurgery, which supports antibacterial and antifungal therapy, silver-containing dressings, and a cream containing *Gentianapurpurea* [11]. Several sources suggest balneotherapy, the mechanism of which is designed to stimulate increased skin permeability and accelerate the passage of minerals and keratolysis [8]. The technique is reported to show good results [9].

The literature describes rare cases of surgical treatment of complications of skin manifestations, mainly in squamous cell carcinoma of the skin. The article presents a case of secondary skin infection in a girl with KID syndrome.

## I. CASE REPORT

A 17-year-old girl diagnosed with KID syndrome presented to the department of purulent and emergency surgery of the N. F. Filatov State Clinical Hospital with complaints of painful infiltrates in the parietal area. A month before the admission, the patient had a single painful 2x2-cm hyperemic duration in the parietal area, and therefore received conservative treatment (bandages with "Levomekol") with no positive effect. Within a week, there appeared multiple infiltrates, gradually merging and being painful on palpation. Two days before the admission the patient had a fever of up to 38°C.

Medical history indicates that the patient is from the second pregnancy (without complications), the

second birth, and full-term. In the neonatal period, the patient had lamellar peeling of the skin, dryness, thickening of the skin in the areas of the shins, neck, face, elbows, and popliteal folds. Over time, yellowish-brown almost black scales joined together, mainly in the head area. At 2 months, sensorineural hearing loss was detected. She was observed by an ophthalmologist for keratitis and photophobia. The patient was diagnosed with KID syndrome at 12 months.

On examination, the patient was feverish (37.8°C). The skin was dry and with follicular keratosis. There was no growth of eyebrows and eyelashes. In the areas of the extensor surfaces of the elbow, knee joints, and the gluteal fold, the skin was thickened and pigmented. The skin of the parietal area was with multiple yellow-brown scaly overlays. Palpation revealed several painful and edematous infiltrates, some being with fluctuation. The clinical blood test showed the number of white blood cells to bear 10,2x10<sup>9</sup> cl/l. Urinalysis and blood biochemistry were normal.



Fig. 1: Hyperkeratosis of the popliteal pits.



Fig. 2: The scalp at admission.



Fig. 3: Onychomycosis of the upper extremities.

The preliminary diagnosis was KID syndrome with multiple abscesses of the skin of the parietal region.

The patient being under facemask general anesthesia, we opened multiple abscesses and obtained many of purulent contents (from 3 to 15 ml), which then sent for microbiological examination. It demonstrated the growth of *Staphylococcus epidermidis*. The wounds were not drained, as there was no need for this.



*Fig. 4:* Before surgery: rear view and lateral view.

In the postoperative period, the patient received antibacterial (Cefazolin 1gh3 p, IV) and antihistamine (Suprastin 1,0x2 p, IV) therapy, local silver-containing dressings, and physiotherapy (UHF). During daily dressings, elements of keratosis were removed with a Volkmann spoon, non-viable skin areas were excised, and abscess cavities were flushed with an antiseptic solution (Chlorhexidine 0.05%). The pus-like discharge from the wounds persisted for 7 days; the pain on palpation disappeared within 2–3 days; and no new foci of inflammation were noted. On day 12, the patient was discharged in a moderate condition.



*Fig. 5:* After surgery: rear view and lateral view.

The prognosis is relatively favorable. KID syndrome predisposes patients to squamous cell carcinoma and an increased incidence of bacterial, viral, and fungal infections. Due to sensorineural deafness, speech development is usually delayed. Corneal vascularization, bilateral, but asymmetric, is very common (in more than 80% of cases). Repeated corneal erosions, corneal leukomas, meibomitis, and severe dry eye syndrome are often observed [6].

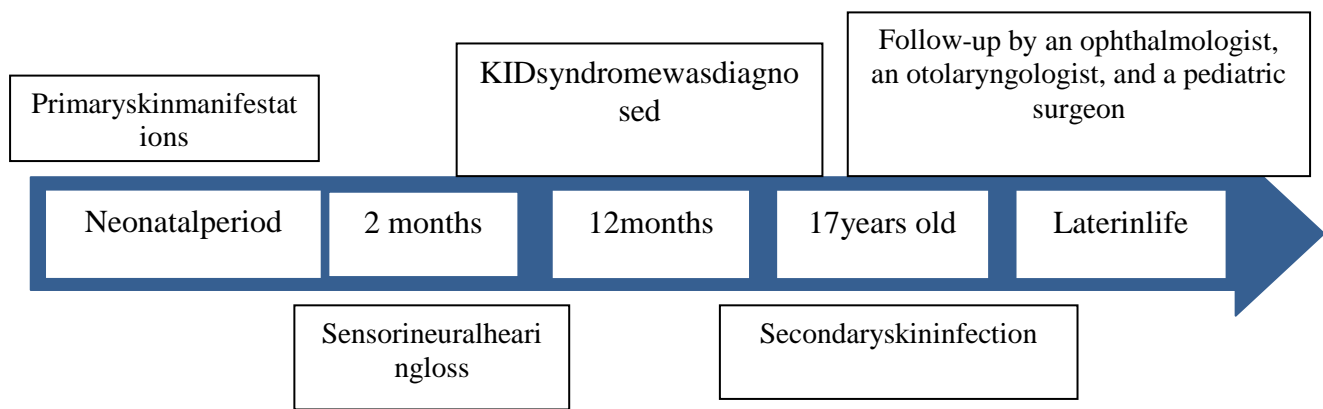


Fig. 6: The girl, 17 years old, clinical course, key events and prognosis.

## II. DISCUSSION

KID syndrome is a rare congenital disease. Patients with KID syndrome are liable to squamous cell carcinoma and an increased incidence of bacterial, viral, and fungal infections. These were the complications with which the patient presented to hospital. The treatment was carried out by with the principles of purulent surgical infection.

The surgical approach, which includes the opening and drainage of abscesses, is validated, since the abscesses can be complicated by their rupture and spread of pus into adjacent tissues and the formation of deep phlegmons of the head, including the subcutaneous ones. This can lead to the spread of the purulent process to the face and neck and thus increase the risk of cavernous sinus thrombosis and sepsis [13]. A microbiological examination of the purulent contents should be carried out to select antibacterial therapy. For local treatment, it is recommended to open and drain abscesses, remove keratin layers, and use silver-containing dressings with antibacterial properties made of polyamide mesh [3].

In surgical practice, patients with KID syndrome are rare. Therefore, such patients require special approach to the treatment of secondary infection.

The treatment of this pathology is based on the prevention of secondary surgical, ophthalmic, and otolaryngological complications. In case of secondary skin infection, only a comprehensive approach, which included local wound care, symptomatic and antibacterial therapy, gives a good income of treatment.

## III. CONCLUSION

Today, there is no standard therapy and opinion on how to treat patients with KID syndrome. The treatment of this pathology is based on the prevention of secondary surgical, ophthalmological, and otolaryngological complications.

### Informed Consent

The consent of the patient's parents to the publication of the clinical case was not received. The information presented in this article was depersonalized, identifying information was deleted.

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### Conflict of Interest

The authors declare no conflict of interest.

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## REFERENCES RÉFÉRENCES REFERENCIAS

1. Lyashenko N. V., Kolyaseva N. A. KID-syndrome: congenital ichthyosiform erythroderma with deafness and keratitis. Topical issues of dermatovenerology and cosmetology. 2016 №4.
2. Markova T. G., Brazhkina N. B., Gemini E. V., etc. . Diagnosis of keratitis-ichthyosis-deafness syndrome (KID syndrome). Bulletin of Otolaryngology, 3, 2012. 58-61.
3. Mercedes E, Gonzalez M, Brook E, Tlougan M et al. Keratitis-ichthyosis-deafness (KID) syndrome. Dermatology Online Journal 15 (8): 11
4. Vivek Kumar Dey, Animesh Saxena, and Shrini Parikh. KID Syndrome: A Rare Genodermatosis. Indian Dermatol Online J. 2020 Jan-Feb; 11(1): 116–118.
5. Klimenko V. A. Clinical observation of a child with KID syndrome. A healthy child. 2015. №6.
6. Ali Abdollahi MD1, Zahra Hallaji MD2, Nafiseh Esmaili MD2, Mahin Valikhani MD2, Masoumeh

- Barzegari MD2, Maryam Akhyani MD2, Siavash Toosi MD2, Alireza Miresmaili MD2. KID syndrome. *Dermatology Online Journal* 13 (4): 11.
7. Coggshall K, Farsani T, Ruben B, et al. Keratitis, ichthyosis, and deafness (KID) syndrome: a review of infectious and neoplastic complications. *J Am Acad Dermatol* 2013; 69(1): 127-34. doi: 10.1016/j.jaad.2012.12.965
  8. Alli N, Gungor E. Keratitis, ichthyosis and deafness (KID) syndrome. *Int J Dermatol* 1997; 36: 37-40.
  9. Ayush K. Kapila, MBBS, MD, MRCS; Randy De Baerdemaeker, MD; Fadi Bakal, MD; Valerie Hanssens, MSc; Jeannine Spinnael, MSc; Benoit Hendrickx, MD, PhD; Assaf Zeltzer, MD, PhD; and Moustapha Hamdi, MD, PhD A Rare Case of KID Syndrome: The Use of Hydrosurgery and Strategies for Antiseptic Wound Care.
  10. Jovanović D, Paravina M, Stanojević M, Todorović J, Binč I, Milenković R, et al. Keratitis, ichthyosis and deafness (KID) syndrome: case study. *Acta Med Median* 1998; 5: 67-72.
  11. Stepanovic M, Paravina M, Jankovic et al. Keratitis, Ichthyosis and Deafness (KID) Syndrome – a Case Report/ *Serbian Journal of Dermatology and Venereology* 2013; 5 (1): 22-30.
  12. Murashkin N. N., Ambarchyan E. T., Epishev R. V., Materikin A. I. Barrier properties of the skin in normal and pathological conditions. *Journal of Pediatrics*. 2015.
  13. Gostischev V. K. General surgery: textbook /. - 4th ed., reprint. and additional - 2010. - 848 p.

# GLOBAL JOURNALS GUIDELINES HANDBOOK 2021

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# MEMBERSHIPS

## FELLOWS/ASSOCIATES OF MEDICAL RESEARCH COUNCIL

### FMRC/AMRC MEMBERSHIPS

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FMRC/AMRC is the most prestigious membership of Global Journals accredited by Open Association of Research Society, U.S.A (OARS). The credentials of Fellow and Associate designations signify that the researcher has gained the knowledge of the fundamental and high-level concepts, and is a subject matter expert, proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice. The credentials are designated only to the researchers, scientists, and professionals that have been selected by a rigorous process by our Editorial Board and Management Board.

Associates of FMRC/AMRC are scientists and researchers from around the world are working on projects/researches that have huge potentials. Members support Global Journals' mission to advance technology for humanity and the profession.

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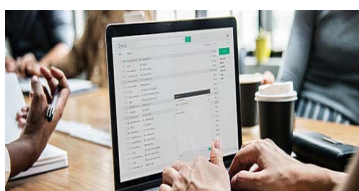
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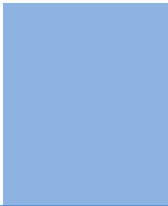
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### ***Manuscript Style Instruction (Optional)***

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

### ***Structure and Format of Manuscript***

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

- a) A title which should be relevant to the theme of the paper.
- b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
- c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
- d) An introduction, giving fundamental background objectives.
- e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
- f) Results which should be presented concisely by well-designed tables and figures.
- g) Suitable statistical data should also be given.
- h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

- i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
- j) There should be brief acknowledgments.
- k) There ought to be references in the conventional format. Global Journals recommends APA format.

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Numerical methods used should be transparent and, where appropriate, supported by references.

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Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

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**15. Never start at the last minute:** Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

**16. Multitasking in research is not good:** Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

**17. Never copy others' work:** Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

**18. Go to seminars:** Attend seminars if the topic is relevant to your research area. Utilize all your resources.

**19. Refresh your mind after intervals:** Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.



**20. Think technically:** Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

**21. Adding unnecessary information:** Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

**22. Report concluded results:** Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

**23. Upon conclusion:** Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

## INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

### Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

### Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

*The introduction:* This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

### The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

### General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

**To make a paper clear:** Adhere to recommended page limits.



### *Mistakes to avoid:*

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

### **Title page:**

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

**Abstract:** This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

*Reason for writing the article—theory, overall issue, purpose.*

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

### **Approach:**

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

### **Introduction:**

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.



*The following approach can create a valuable beginning:*

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

#### **Approach:**

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

#### **Procedures (methods and materials):**

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

#### **Materials:**

*Materials may be reported in part of a section or else they may be recognized along with your measures.*

#### **Methods:**

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

#### **Approach:**

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

#### **What to keep away from:**

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.



**Results:**

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

**Content:**

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

**What to stay away from:**

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

**Approach:**

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

**Figures and tables:**

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

**Discussion:**

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."



Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

#### **Approach:**

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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Topics	Grades		
	A-B	C-D	E-F
<b>Abstract</b>	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
<b>Introduction</b>	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
<b>Methods and Procedures</b>	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
<b>Result</b>	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
<b>Discussion</b>	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
<b>References</b>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



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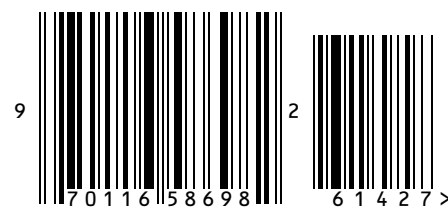


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