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ASSOCIATION OF PATIENTS RECEIVING CORTICOSTEROID DRUG THERAPY AND FURTHER DEVELOPMENT OF COMMUNITY ACQUIRED PNEUMONIA

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ABSTRACT : Community-acquired pneumonia (CAP) is a common disorder that is potentially life threatening, especially in older adults and those with comorbid disease. Community-acquired pneumonia is defined as pneumonia that is acquired outside the hospital. The most commonly identified pathogens are *Streptococcus pneumoniae*, *Haemophilus influenzae*, atypical bacteria (i.e., *Chlamydia pneumoniae*, *Mycoplasma pneumoniae*, *Legionella* species), and viruses. The predominant pathogen in CAP is *Streptococcus pneumoniae* (pneumococcus), which accounts for about two-thirds of all cases of bacteraemic pneumonia. Use of corticosteroids was associated with an increase of 70% in the rate of hospital admission for pneumonia. The admission rate was greatest with the highest doses of corticosteroids used, and a reduction in risk once corticosteroids were stopped was observed. Thus, the use of corticosteroids for pneumonia should be carefully considered and prescribed by a healthcare professional.

KEYWORDS : Community acquired pneumonia, *Streptococcus pneumoniae*, Corticosteroid, Life threatening

INTRODUCTION : Community-acquired pneumonia (CAP) is the most common infectious respiratory disease. In developed countries, it is the leading cause of death from infection and the sixth most prevalent cause of overall mortality, thus contributing to high economic and social costs.¹⁻³ Patients with severe CAP normally require mechanical ventilation (MV) and ICU admission. Despite remarkable advances in etiological investigation, antimicrobial therapy, and supportive measurements, the mortality of those patients still remains at ~50%.^{4,5} Therefore, additional potential approaches are needed for better outcomes in severe CAP. [1,2]

Recent studies found that the levels of pro-inflammatory cytokines such as interleukin (IL)-6, IL-8, IL-10, IL-1 β , tumor necrosis factor alpha, and interferon gamma were significantly increased in patients with severe CAP and correlated with the severities and outcomes of CAP.^[9] Appropriately producing cytokines in location play a role in inhibition and elimination of primary infection, but an excessive systemic and pulmonary inflammatory response in patients with severe CAP may contribute to injuries to the lung and other organs. This leads to sepsis, lung injury, and ARDS and is associated with poor prognosis and high mortality. Therefore, down regulation of systemic inflammatory response may improve the clinical course of severe CAP.

Corticosteroids are known to be the most potent inflammatory inhibitors. They inhibit expression of pro-inflammatory cytokines and accelerate expression of anti-inflammatory cytokines. The immunomodulation and anti-inflammatory pharmacodynamics profile is the physiologic rationale for their use in patients with severe infection. Furthermore, as the conception of critical illness-related corticosteroid insufficiency was put forward, steroid replacement therapy has been gradually accepted as a treatment for patients with critical illnesses. By measuring random and cutoff levels of cortisol, Salluh et al found that patients with severe CAP had a high prevalence of adrenocortical insufficiency. Another study reported that the baseline cortisol levels were positively correlated with disease severity scores, for example, APACHE II (Acute Physiology and Chronic Health Evaluation II); Sequential Organ Failure Assessment; and confusion, urea nitrogen, breathing frequency, blood pressure, ≥ 65 years of age (CURB-65). It has been suggested that baseline cortisol levels were better predictors of severity and outcome in patients with severe CAP than post-corticotrophin cortisol levels or routinely measured laboratory parameters (C-reactive protein, leukocyte count, and D-dimer) and scores of severity. Meduri et al demonstrated in an in vitro study that methylprednisolone (MPDN) could decrease lung inflammatory response and lung bacterial burden. Nevertheless, the notion that corticosteroid treatment is beneficial to severe CAP has not currently reached a consensus. [14]

risk factors for CAP :

Categories of effect of risk factors	Percentage of studies favoring the effect	NOS quality versus other categories of effect	Standardized definition
Significant risk factor	>66%	Higher Lower	Clear risk factor No definitive conclusion
Significant protective factor	>66%	Higher Lower	Clear protective factor No definitive conclusion
Nonsignificant risk factor	>66%	Higher Lower	No effect No definitive conclusion
Significant risk factor	$\leq 66\%$	Not applicable	No definitive conclusion
Significant protective factor	$\leq 66\%$	Not applicable	No definitive conclusion
Nonsignificant risk factor	$\leq 66\%$	Not applicable	No definitive conclusion

CAP, community-acquired pneumonia; NOS, Newcastle-Ottawa Scale.

Corticosteroids are medications that can weaken the immune system, making individuals more susceptible to infections like pneumonia. Risk factors for developing pneumonia while using corticosteroids include:

1. High Dose: Higher doses of corticosteroids increase the risk of infections, including pneumonia.
2. Long Duration: Prolonged use of corticosteroids can also elevate the risk, especially if taken for several weeks or months.
3. Underlying Conditions: People with pre-existing lung conditions (e.g., COPD), immunosuppressive diseases, or other chronic illnesses may be more susceptible.
4. Age: The elderly are generally at a higher risk due to weakened immune systems and comorbidities.
5. Concurrent Medications: Some medications taken alongside corticosteroids, such as immunosuppressant's, can further increase the risk.
6. Smoking: Smoking is a significant risk factor for pneumonia, and when combined with corticosteroid use, it amplifies the vulnerability.
7. Hospitalization: Corticosteroids are often administered in hospital settings, where pneumonia-causing bacteria can be more prevalent.

It's essential to use corticosteroids under a doctor's supervision, follow prescribed dosages, and monitor for any signs of infection while taking them. If you have concerns about the risk of pneumonia, discuss them with your healthcare provider. [24-30]

PHARMACOLOGICAL TREATMENT OF CAP

Corticosteroid-induced pneumonia is a rare but serious side effect of prolonged corticosteroid use. Treatment typically involves addressing the underlying cause (corticosteroid therapy) while managing the pneumonia itself. Here are some general steps for managing corticosteroid-induced pneumonia:

1. **Discontinue or reduce corticosteroid use:** The primary step is to decrease or discontinue the corticosteroid medication that triggered the pneumonia, under medical supervision.
2. **Antibiotics:** Depending on the severity and type of pneumonia, antibiotics may be prescribed to treat or prevent secondary bacterial infections.
3. **Supportive care:** Supportive measures such as oxygen therapy, hydration, and rest may be necessary to help the body recover from pneumonia.
4. **Corticosteroid adjustment:** In some cases, a healthcare provider may cautiously adjust the dose of corticosteroids to find the lowest effective dose that still manages the underlying condition. [24]
5. **Close monitoring:** Regular follow-up appointments and monitoring of symptoms, chest X-rays, or other imaging studies may be needed to track progress and make treatment adjustments.

It's important to consult with a healthcare professional for an individualized treatment plan and to address any specific concerns related to corticosteroid-induced pneumonia, as the approach may vary based on the patient's condition and medical history.

NON-PHARMACOLOGICAL TREATMENT OF CAP

Non-pharmacological treatments for corticosteroid-induced pneumonia primarily focus on reducing the risk of infection and promoting overall lung health. Here are some non-pharmacological approaches:

1. Infection Prevention:

- Practicing good hand hygiene.
- Avoiding close contact with individuals who have respiratory infections.
- Ensuring up-to-date vaccinations, especially for influenza and pneumonia.

2. Smoking Cessation: If the patient smokes, quitting smoking is essential to improve lung health and reduce the risk of respiratory infections.

3. Hydration: Staying well-hydrated can help thin mucus and make it easier to clear from the airways.

4. Humidification: Using a humidifier in the home can add moisture to the air, which may ease breathing and reduce irritation.

5. Chest Physiotherapy: Techniques such as postural drainage and chest percussion may help to mobilize mucus and improve lung function.

6. Oxygen Therapy: If the pneumonia leads to severe respiratory distress, supplemental oxygen therapy may be necessary.

7. Nutrition: A well-balanced diet rich in fruits, vegetables, and lean proteins can support the immune system and overall health.

8. Exercise: Under the guidance of a healthcare professional, appropriate exercise can help maintain lung function and strengthen respiratory muscles.

9. Pulmonary Rehabilitation: In some cases, structured pulmonary rehabilitation programs can aid in improving lung function and overall well-being.

10. Monitoring: Regular follow-up appointments with a healthcare provider are crucial to monitor lung function and adjust treatment as necessary.

It's essential for individuals with corticosteroid-induced pneumonia to work closely with their healthcare team to determine the most appropriate non-pharmacological interventions based on their specific condition and medical history. These approaches can complement pharmacological treatments prescribed by a healthcare professional.

EXAMPLE OF CORTICOSTEROID DRUGS THAT CAUSES CAP.

Corticosteroid medications, when used at high doses or for prolonged periods, can increase the risk of developing corticosteroid-induced pneumonia. This condition is often referred to as "corticosteroid-induced pneumonia" or "steroid-induced pneumonia." While corticosteroids can be essential for managing various medical conditions, including inflammatory and autoimmune disorders, it's important to note that they can suppress the immune system, making the body more susceptible to infections like pneumonia.

Common examples of corticosteroid drugs that can increase the risk of corticosteroid-induced pneumonia include:

1. Prednisone
2. Dexamethasone
3. Prednisolone
4. Methylprednisolone
5. Hydrocortisone
6. Betamethasone

The risk of developing pneumonia while taking corticosteroids varies depending on the dose, duration of treatment, and individual patient factors. It's crucial for healthcare providers to carefully consider the potential risks and benefits of corticosteroid therapy and monitor patients closely when using these medications, especially when high doses or long-term treatment is necessary. [33]

CONCLUSION :

Corticosteroids are sometimes used as a treatment for pneumonia to reduce inflammation in the lungs. However, the use of corticosteroids for pneumonia should be carefully considered and prescribed by a healthcare professional. The conclusion regarding their effectiveness and safety depends on various factors, including the type and severity of pneumonia, the patient's overall health, and individual medical history. It is essential to follow medical advice and treatment plans provided by your healthcare provider for the best outcome.

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