Golda Sahaya Rani, R., & Swaminathan, A.,(2023). *J CAM Res Progress, 2*(1): 108
https://doi.org/10.33790/jcrp1100108

Journal of CAM Research Progress

Goodpasture's Syndrome (GPS): A Nursing Approaches

R. Golda Sahaya Rani[1*], & Aruna Swaminathan[2]

[1]Professor, Department of Medical Surgical Nursing, Sri Sathya Sai College of Nursing, Shri Balaji Vidyapeeth University, Puducherry, India.*
[2]Assistant professor, Department of Nursing, University College at Aldayer, Jazan University, Kingdom of Saudi Arabia.

Article Details

Article Type: Review Article
Received date: 03rd January, 2023
Accepted date: 16th February, 2023
Published date: 20th February, 2023

***Corresponding Author:** R. Golda Sahaya Rani, Professor, Department of Medical Surgical Nursing, Sri Sathya Sai College of Nursing, Shri Balaji Vidyapeeth University, Puducherry, India.

Citation: Golda Sahaya Rani, R., & Swaminathan, A., (2023). Goodpasture's Syndrome (GPS): A Nursing Approaches. *J CAM Research Progress, 2*(1): 108. doi: https://doi.org/10.33790/jcrp1100108.

Abstract

Goodpasture syndrome (GPS), also known as anti-glomerular basement membrane disease, which is a rare autoimmune condition. Critical care and advanced practice nurses can play a major role in ensuring positive patient outcomes and eliminating problems, this uncommon autoimmune disorder results in lung haemorrhage, glomerulonephritis, and kidney failure. Circulating antibodies are directed against the collagen of the part of the kidney known as the glomerular basement membrane (GBM). Goodpasture syndrome can result in potentially fatal lung haemorrhage, it commonly does not harm the lungs permanently. Kidney failure is the most devastating side effect of Goodpasture syndrome and may required for dialysis or a kidney transplant. The patient and family need expert nursing care, psychological support, and emotional support to manage this frequently fatal illness.

Keywords: Goodpasture Syndrome, Anti-GBM (glomerular basement membrane) Antibody, Kidney Failure, Nursing Approaches

Introduction

Goodpasture syndrome is an uncommon but dangerous autoimmune condition damages the kidneys and lungs. The condition develops as a result of the immune system's inappropriate production of antibodies against collagen in the kidneys and lungs [1]. In 1919, American pathologist Ernest Goodpasture of Vanderbilt University published the first description of the illness. Initial Goodpasture syndrome symptoms include vague ones like lethargy. The incidence of GPS, an uncommon autoimmune disorder, is less than one case in one million population [2]. With an estimated prevalence of 0.5 to 1.8 cases per million per year in populations of European whites and Asians, Goodpasture disease is incredibly uncommon. The condition primarily affects white people, with a age distribution between 20 and 30 and 60 and 70. Men in the younger age group and women in the older age subgroup are more likely to have the condition. However, it can quickly spread to the kidneys and lungs. If it is not promptly identified and treated, it is almost invariably fatal [3, 4, 5].

Definition

Goodpasture syndrome is a serious autoimmune condition. It triggers the immune system to destroy kidney and lung tissues. Goodpasture syndrome (GPS), a rare can cause renal failure, glomerulonephritis, and pulmonary haemorrhage. Dialysis or kidney transplantation, together with intensive immunosuppressant and antimicrobial therapy, all enhance the prognosis [6,7].

Causes of Goodpasture Syndrome

- The probable cause is not known.
- Goodpasture syndrome is genetically predisposed, and the human leukocyte antigen (HLA) system is involved.
- Organic solvent exposure (e.g. chloroform)
- Inhaling cocaine, acquiring an infection (like influenza A), being exposed to dry cleaning chemicals, and smoking cigarettes are all risk factors.
- Targeting the capillaries in the lungs and kidneys as well as their lining membranes [8, 9].

Pathophysiology of Goodpasture Syndrome

* Anti-GBM antibodies produced abnormally by plasma cells are the cause of Goodpasture syndrome.
* The non-collagen domain of the alpha-3 chain of type 4 collagen, which is mostly present in the basal membranes of glomerular and alveolar capillaries, is the main target of these abnormal antibodies, which causes the condition's mysterious symptoms [10].
* This priority targeting of these alpha-3 collagen chains in the basal membranes of glomerular and alveolar capillaries can be explained by the higher accessible exposure of epitopes, a larger expansion of the alpha-3 collagen units, and the structurally higher accessibility of these alpha-3 collagen chains for the targeting antibodies [11,12].
* The tagged cells perish as a result of the complement cascade being activated by these antibodies, which bind their reactive epitopes to the basement membranes.
* This results in sub-basement pulmonary haemorrhage, alveolar injury, proteinuria, haematuria, and oliguria [13, 14].

Symptoms of Goodpasture Syndrome

The first signs of Goodpasture syndrome may include:

- Lethargy, vomiting and nausea, breathing problems, and pale skin [15].

- Initial signs of the Goodpasture syndrome, such as shortness of breath, can soon develop into a chronic cough, occasionally with blood [16].

Symptoms of Goodpasture syndrome that affect the kidneys include:

- Foamy urine, Blood in the urine, swelling in the legs, elevated blood pressure, difficulty urinating or burning micturition, below-the-rib back ache, the hands and feet swelling [17,18].

Diagnostic Evaluation of Goodpasture Syndrome

The diagnostic examinations listed below are:

- A medical history and physical examination are required for the diagnosis of Goodpasture syndrome.
- A biopsy of the afflicted tissues, mainly the kidney, is the most precise way to make the diagnosis. The degree of any kidney damage can also be obtained by evaluating renal tissue.
- Urinalysis: High protein and red blood cell counts in the urine can be signs of renal injury.
- A blood test antibodies that targeting the kidneys and lungs can be detected in a blood sample.
- A chest X-ray the findings can show lung injury. For example, aberrant white patches are connected to bleeding in the lungs [19, 20].

Treatment of Goodpasture Syndrome

Good pasture syndrome requires prompt and intensive treatment to:

- Fight off pathogenic antibodies,
- Manage fluid retention,
- Regulate high blood pressure, and
- Avoid serious lung and kidney damage [21].

► Oral immunosuppressive medications like cyclophosphamide and corticosteroids are frequently used in treatment. These medications reduce the amount of Goodpasture syndrome antibodies produced by the immune system. To keep the remission going, other, less harmful immunosuppressants such azathioprine may be administered.

► To stop lung haemorrhage in some circumstances, intravenous corticosteroids may be required.

► Immunosuppressive medication could be used for another six to twelve months, depending on how well the patient responds to treatment.

► Plasmapheresis, a technique in which the affected person's blood is passed through a centrifuge and the constituent components are separated based on weight, is the basis of treatment for GPS.

► Relapsing pulmonary haemorrhage associated with Good pasture's illness that is resistant to standard treatment. Mycophenolate mofetil 1 g every 12 hours and prednisolone 60 mg daily comprised the second line of treatment [22, 23].

Prognosis of Goodpasture Syndrome

→ A few Goodpasture syndrome victims do pass die during their disease's initial stage, which is typically rather intense. More than 90% of patients who receive appropriate care survive this stage of the illness [24].

→ The prognosis for the client with Goodpasture syndrome has improved with the emergence of plasmapheresis, but there is still a danger of infection due to the frequent invasive catheters and procedures, and using immunosuppressive medicines can have adverse side effects [25].

→ The benefits of these medications much outweigh the risks. Careful surveillance and competent collaboration are essential for these patients' survival. Without therapy, nearly every affected person will die naturally from advanced kidney failure or lung haemorrhages. With treatment, the five-year survival rate is >80% and less than 30% of affected people need long-termdialysis [26].

Nursing Approaches of Goodpasture's Syndrome

* Check the breath sounds and respiratory rate frequently.
* The patient should be encouraged to evaluate their energy.
* Keep a record of the patient's daily weight, BUN, creatinine clearance, and intake and output.
* Teach the patient how to consume less protein.
* Elevate the head of the bed and provide them humidified oxygen to help the patient get enough oxygen.
* As prescribed, assist with plasmapheresis.
* The patient's haematocrit, coagulation studies, arterial blood gas levels, and vital signs should all be monitored [27].
* Treat severe iron deficiency anaemia with blood transfusions, and as directed, give corticosteroids.
* To treat renal failure, get the patient ready for dialysis or a kidney transplant.
* Pay careful attention for any indications of a transfusion reaction or a lack of response to the corticosteroids.
* Emphasize the value of energy conservation, particularly if the patient develops iron deficiency anaemia.
* Teach the patient's family the symptoms of genitourinary or respiratory haemorrhage [28, 29].

Complications

This condition, if left untreated, may result in any of the following:

- Lung disease.
- Glomerulonephritis that advances quickly.
- Serious pulmonary bleeding (lung bleeding).
- Chronic kidney disease.
- End-stage kidney disease [30, 31].

Conclusion

The high rate of complications linked to Goodpasture syndrome makes caring for patients challenging. The development of antibodies against the glomerular basement membrane and alveolus results in Goodpasture syndrome, a serious condition that impairs renal and pulmonary function. Critical care, advanced practise nurses, and patients with Goodpasture syndrome can all help to ensure positive patient outcomes and avoid problems. Awareness about Goodpasture Syndrome will empower us, as nurses, to evaluate and treat the mentioned conditions as soon as possible.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

1. Cranfield, A., & Mathavakkannan, S. (2015). Goodpasture's disease following extracorporeal shock wave lithotripsy: a case report & literature review. *Clinical Case Reports, 3*(3), 160–164. doi:10.1002/ccr3.190
2. Qin, J., Song, G., & Liu, Q. (2017). Goodpasture's syndrome in early pregnancy: A case report. *Experimental and Therapeutic Medicine*. doi:10.3892/etm.2017.5425
3. McAdoo, S. P., & Pusey, C. D. (2017). Anti-glomerular basement membrane disease. *Clinical Journal of the American Society of Nephrology: CJASN, 12*(7), 1162–1172. doi:10.2215/cjn.01380217

4. Phelps, R. G., & Rees, A. J. (1999). The HLA complex in Goodpasture's disease: a model for analyzing susceptibility to autoimmunity. *Kidney International, 56*(5), 1638–1653. doi:10.1046/j.1523-1755.1999.00720.x
5. Bethel Shiferaw (2018),Goodpasture's Disease: An Uncommon Disease With an Atypical Clinical Course, *J Clin Med Res. 2016; 8*(1):52-55,doi: http://dx.doi.org/10.14740/jocmr2379w
6. Shah MK, Hugghins SY. (2002), Characteristics and outcomes of patients with Goodpasture's syndrome. *South Med J,95*(12):1411-1418
7. lis G, Huart A, Guitard J, Fortenfant F, Chauveau D, (2012). IgAmediated anti-glomerular basement membrane disease: An uncommon mechanism of Goodpasture's syndrome. *Clin Kidney J 5*:545–548.
8. Dahlgren, J., Wardenburg, M., & Peckham, T. (2010). Goodpasture's syndrome and silica: A case report and literature review. *Case Reports in Medicine, 2010*, 1–6. doi:10.1155/2010/426970
9. Dammacco, F., Battaglia, S., Gesualdo, L., & Racanelli, V. (2013). Goodpasture's disease: a report of ten cases and a review of the literature. *Autoimmunity Reviews, 12*(11), 1101–1108. doi:10.1016/j.autrev.2013.06.014
10. Borza, D.-B., Neilson, E. G., & Hudson, B. G. (2003). Pathogenesis of Goodpasture syndrome: a molecular perspective. *Seminars in Nephrology, 23*(6), 522–531. doi:10.1053/s0270-9295(03)00131-1
11. Shin, J. I., Geetha, D., Szpirt, W. M., Windpessl, M., & Kronbichler, A. (2022). Anti-glomerular basement membrane disease (Goodpasture disease): From pathogenesis to plasma exchange to IdeS. *Therapeutic Apheresis and Dialysis: Official Peer-Reviewed Journal of the International Society for Apheresis, the Japanese Society for Apheresis, the Japanese Society for Dialysis Therapy, 26*(1), 24–31. doi:10.1111/1744-9987.13718
12. Hope, L., & Swann, D. (2001). Dawn. Goodpasture syndrome: Pathophysiology, diagnosis, and management. *Nephrology Nursing Journal, 28*(3), 311–312
13. Hellmann, M. A., Gerhardt, T. M., Rabe, C., Haas, S., Sauerbruch, T., & Woitas, R. P. (2006). Goodpasture's syndrome with massive pulmonary haemorrhage in the absence of circulating anti-GBM antibodies? *Nephrology, Dialysis, Transplantation: Official Publication of the European Dialysis and Transplant Association - European Renal Association, 21*(2), 526–529. doi:10.1093/ndt/gfi279
14. Beirne, G. J., Md; William, L., & Md; Stephen, W. (1973). Goodpasture Syndrome Dissociation From Antibodies to Glomerular Basement Membrane. *MD Author Affiliations Arch Intern Med, 132*(2), 261–263. doi:10.1001/archinte.1973.03650080105020
15. Hacking, C., & Darrsh, M. (2010). Goodpasture syndrome. *In Radiopaedia.org*.
16. Is, G., Huart, A., Guitard, J., Fortenfant, F., & Chauveau, D. (2012). IgAmediated anti-glomerular basement membrane disease: An uncommon mechanism of Goodpasture's syndrome. *Clin Kidney J, 5*, 545–548.
17. Hellmark, T., Segelmark, M., Unger, C., Burkhardt, H., Saus, J., & Wieslander, J. (1999). Identification of a clinically relevant immunodominant region of collagen IV in Goodpasture disease. *Kidney International, 55*(3), 936–944. doi:10.1046/j.1523-1755.1999.055003936.x
18. Zhong, Z., Tan, J., Tang, Y., Li, Z., & Qin, W. (2020). Goodpasture syndrome manifesting as nephrotic-range proteinuria with anti-glomerular basement membrane antibody seronegativity: A case report: A case report. *Medicine, 99*(39), e22341. doi:10.1097/MD.0000000000022341
19. Hellmark, T., & Segelmark, M. (2014). Diagnosis and classification of Goodpasture's disease (anti-GBM). *Journal of Autoimmunity*, 48–49, 108–112. doi:10.1016/j.jaut.2014.01.024
20. Vucković, B., Ilić, T., Mitić, I., Knezević, V., Vodopivec, S., & Curić, S. (2004). Goodpasture's syndrome--case report. *Medicinski pregled, 57*(7–8), 391–395. doi:10.2298/mpns0408391v
21. Raval, P. (2015). Goodpasture's Syndrome*. In *Reference Module in Biomedical Sciences*. Elsevier.
22. Malho, A., Santos, V., Cabrita, A., Silva, A. P., Pinto, I., Bernardo, I., & Neves, P. L. (2010). Severe relapsing Goodpasture's disease successfully treated with mycophenolate mofetil. *International Journal of Nephrology, 2010*, 383548. doi:10.4061/2010/383548
23. Charles D. (2003), Anti-glomerular basement membrane disease, Kidney International, 64, 1535–1550.
24. Stojkovikj, J., Zejnel, S., Gerasimovska, B., Gerasimovska, V., Stojkovic, D., Trajkovski, M., … Jovanovski, S. (2016). Goodpasture syndrome diagnosed one year and A half after the appearance of the first symptoms (case report). *Open Access Macedonian Journal of Medical Sciences, 4*(4), 683–687. doi:10.3889/oamjms.2016.127
25. Henderson, S. R., & Salama, A. D. (2018). Diagnostic and management challenges in Goodpasture's (anti-glomerular basement membrane) disease. *Nephrology, Dialysis, Transplantation: Official Publication of the European Dialysis and Transplant Association - European Renal Association, 33*(2), 196–202. doi:10.1093/ndt/gfx057
26. Syndrome, E. A., & Md;, D. V. (1964). Prolonged Survival in Goodpasture. *Affiliations Arch Intern Med, 114*(3), 453–460. doi:10.1001/archinte.1964.03860090187024
27. Avella, P., & Walker, M. (1999). Goodpasture's syndrome: a nursing challenge. *Dimensions of Critical Care Nursing: DCCN, 18*(2), 2–12.
28. Senel, T. E., Clinic of Nephrology, Health Sciences University Haseki Training and Research Hospital, Istanbul, Turkey, Uzun, S., Cebeci, E., Ozkan, O., Behlul, A., …. (2019). Case report of a patient with Goodpasture's syndrome who relapsed while on hemodialysis. *Turkish Journal of Nephrology, 28*(1), 88–90. doi:10.5152/turkjnephrol.2019.3073
29. Shah, M. K. (2002). Outcomes in patients with Goodpasture's syndrome and hydrocarbon exposure. *Renal Failure, 24*(5), 545–555. doi:10.1081/jdi-120013957
30. Kandula, M., Karthika, P., & Nadira. (2019). Good pasture syndrome-A case presentation. *International Journal of Nursing Education and Research, 7*(3), 408. doi:10.5958/2454-2660.2019.00092.9
31. Nahhal, S., Halawi, A., Basma, H., Sr, Jibai, A., & Ajami, Z. (2020). Anti-glomerular basement membrane disease as a potential complication of COVID-19: A case report and review of literature. *Cureus, 12*(12), e12089. doi:10.7759/cureus.12089
32. Sinha, V. K., & Hibbert, C. (2015). Near-lethal acute kidney injury due to Goodpasture's syndrome: A case report. *Journal of the Intensive Care Society, 16*(4), 350–354. doi:10.1177/1751143715593560