INTRODUCTION

Aplastic anemia, an unusual hematologic disease, is the paradigm of the human bone marrow failure syndromes.[1] Aplastic anemia is not a type of cancer but may be associated with certain types of cancers or cancer treatments. Aplastic anemia may be inherited or acquired. Inherited aplastic anemia is caused by abnormal copies of genes, gene mutation that is passed on from parents to their offspring. Inherited bone marrow failure syndromes (BMFS) those increase the risk of aplastic anemia include Fanconi anemia, dyskeratosis congenita, Shwachman- Diamond syndrome of which Fanconi anemia is the most common one.[2] Acquired aplastic anemia can be triggered by a drug, exposure to toxic chemicals or infection with some types of viruses.

The most commonly accepted pathogenesis is that these agents trigger an abnormal immune reaction where T-lymphocytes start producing Cytokines in excess amounts which kill bone marrow cells in some individuals.[2] In about 85% of cases, no cause is identified.[3] The incidence of aplastic anemia in west is 2 per million and is about 2 to 3 folds high in Asia.[1] An Indian pediatric study reported the incidence of 6.8 per million in the year 2006 which was found to be higher than many western countries viz. France, Brazil, UK, and United States of America but lower than Sweden and China.[3]

*Correspondence for Author
Arun K. P
Department of Pharmacy Practice JSS College of Pharmacy, Ooty, JSS University, Mysore.
young patients must be referred to an appropriate BMT center for counseling and treatment. In India, related HSCTs are being performed in many centers.\textsuperscript{[4]} The results of HLA identical sibling HSCT are excellent with more than 80% cure.

For patients older than 40 years, immunosuppression is preferred. HSCT is considered as second option in case immunosuppression fails.

**Immunosuppressive Therapy**

Immunosuppressive therapy consists of both Anti-thymocyte globulin (ATG) and Cyclosporine A (CsA). Response rates are about 60% in 3 to 6 months after horse ATG.\textsuperscript{[5, 6]} It is effective in both young and old patients.\textsuperscript{[7, 8]} Active infection is a contraindication. Anti-thymocyte globulin dose is 10 to 20 mg/kg for 8 to 14 days. Additional alternate day therapy up to a total of 21 doses can be administered. Cyclosporine A when given with ATG, initial dose is 5-10 mg/kg/day and can be increased up to 10-15mg/kg.

**Androgens**

Androgens may be tried and shown response in about 15% of aplastic anemia, majority of whom are non-severe.\textsuperscript{[3]} Oxymetholone or stanozolol in doses of 1.5 to 2 mg/day for many months.

**CASE REPORT**

A female patient of 25 years old was admitted in the Female Medical Ward of a secondary care public health care setting with complaints of weakness of body, pedal edema and difficulty in breathing since a week. This patient was a known case of acquired aplastic anemia which was diagnosed 3 years earlier in a tertiary care corporate hospital and the etiology was unknown. Because of the economic constraint of the patient, she could not continue her treatment in the said corporate hospital. Being the secondary care hospital, she was provided only with supportive care and blood transfusions for 3 years. The patient was prescribed with Cyclosporine A, 50 mg OD along with blood transfusions for 3 years. The patient was prescribed with Cyclosporine A, 50 mg OD along with blood transfusions since three months. On the day of admission, prescription was found to be Tab. Ferrous Sulphate BD, Tab. B complex BD, Tab. Furosemide 20 mg BD for pedal edema, Tab. Ranitidine BD. Blood sample was sent for laboratory investigation on the same day.
On day 2, hematological results were obtained (Table 1). Hemoglobin was found to be 2.3 g/dL, red blood cell count was found to be $1.8 \times 10^6$/mm$^3$ and physician ordered for 3 units of blood transfusion and advised the patient to continue Cyclosporine A at the same dose.

On day 3, Physician advised to go for bone marrow transplantation but because of financial constraints, patient denied to opt bone marrow transplantation as a treatment option and was willing to continue on blood transfusions and Cyclosporine A. Physician have added Tab Folic acid BD and advised to continue same treatment.

The patient stayed in the hospital for 13 days and except on days 5 and 6, all other days patient received blood transfusions 1 unit per day and did not experience any allergic reactions because of transfusions.

The patient’s hemoglobin was found to be 6.9 g/dL on day 13 and on request, the patient was discharged with discharge medication Tab. Cyclosporine A, Tab. Ferrous Sulphate BD, Tab. Folic acid BD, Tab. Multivitamin BD, Tab. Ranitidine BD for 15 days.

**TABLE 1: LABORATORY INVESTIGATION REPORT OF THE PATIENT OBTAINED ON SECOND DAY OF ADMISSION.**

<table>
<thead>
<tr>
<th>Clinical Parameter</th>
<th>Values observed in patient</th>
<th>Normal range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin</td>
<td>2.3 g/dL</td>
<td>12-16 g/dL</td>
</tr>
<tr>
<td>Total Count</td>
<td>$2.8 \times 10^3$ cells/ mm$^3$</td>
<td>$3.2-9.8 \times 10^3$ cells/ mm$^3$</td>
</tr>
<tr>
<td>Differential Count:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polymorphs</td>
<td>46%</td>
<td>54-62%</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>46%</td>
<td>25-33%</td>
</tr>
<tr>
<td>Platelet Count</td>
<td>$117 \times 10^3$/µl</td>
<td>$130-400 \times 10^3$/µl</td>
</tr>
<tr>
<td>Red blood cells</td>
<td>$1.80 \times 10^6$/mm$^3$</td>
<td>$3.5-5.0 \times 10^6$/mm$^3$</td>
</tr>
<tr>
<td>Hematocrit</td>
<td>13.7%</td>
<td>33-43%</td>
</tr>
<tr>
<td>Mean cell volume</td>
<td>76.1 flL</td>
<td>76-100 flL</td>
</tr>
<tr>
<td>Mean cell hemoglobin</td>
<td>27.8 pg/cell</td>
<td>27-33 pg/cell</td>
</tr>
<tr>
<td>Mean cell hemoglobin concentration</td>
<td>36.5 g/dL</td>
<td>33-37 g/dL</td>
</tr>
</tbody>
</table>
DISCUSSION

Aplastic anemia is a rare and serious condition which can develop at any age. It has a prevalence rate more in Asian countries than in West. The majority of aplastic anemia studies have been carried out in a retrospective fashion, and their difficulties in diagnosis and the rarity of the disease made the conclusions somewhat speculative. Such studies have, however, indicated that the incidence of aplastic anemia seems to be several fold higher in the Far East, including China, Japan, Thailand and the Indian subcontinent, compared with Europe and the United States. The average cost of bone marrow transplantation in private hospitals in India is around 35000 USD (1 USD ≈ 64 INR) and bone marrow transplantation requires 1 month hospital stay and 3 months follow up period.9 Modified Kuppuswamy scale suggests that average Indian family income (in rupees) will be between less than or equal to Rupees 1589 to more than or equal to Rupees 31,507. After knowing the cost of bone marrow transplantation and cost of hospital stay in private hospitals, patient explained that her family income is rupees 1000 per month and that she could not undergo bone marrow transplantation as per physicians advise because of her socioeconomic status. Two years survival rate with supportive care alone in cases of severe and very severe aplastic anemia is found to be about 80%.10

Recent reports indicate that bone marrow transplantation from a histocompatible donor is effective therapy for severe aplastic anemia. Mortality in transplanted individuals were significantly decreased when compared to non-transplant individuals. Marrow transplant patients require intensive support during pre-transplant immunosuppression and during the 2-3 week period of total aplasia before the transplanted marrow begins to function.

DRUG THERAPY

Immunosuppressive therapy is preferred for patients older than 40 years. Since the age of this patient is 25 years, the preferred treatment is Hematopoietic Stem Cell Transplant.

The advantages are:

a. Recovery of pancytopenia within 2-3 weeks of stem cell infusion.
b. Full recovery of blood counts in majority.
c. Little risk of relapse.
d. Low complication rates in young.

A combination of anti-thymocyte globulin (ATG) and cyclosporine offers the best results with about 60% response.
The patient’s haemoglobin level was found to be increasing; therefore blood transfusion should be continued for this patient.

Tab. Furosemide was given for pedal oedema.

Iron supplements and vitamin supplements were given as a supportive care for this patient.

**CONCLUSION**
Aplastic anemia is an uncommon but potentially serious haematological disorder. It is characterized by pancytopenia secondary to a hypocellular bone marrow. Aplastic anemia accounts for 20-30% cases presenting with pancytopenia. The main treatment includes Transfusion support, Treatment of infections, Hematopoietic stem cell transplant and Immunosuppressive therapy. There is no primary role of corticosteroids or hematopoietic growth factors, except as adjunctive therapy in special circumstances. New immunosuppressive therapies are being evaluated for refractory patients. If such guideline treatment is given to patients in future, the clinical pharmacists have a significant role to play with all such specialized treatment options.

**REFERENCES**
2. American Cancer Society.
