Medical Science

pISSN 2321–7359; eISSN 2321–7367

Effect of manual positioning as an adjuvant to intercostal drainage in a 14-year-old child with a known case of SLE and pleural effusion as a subsequent consequence: A case report

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To Cite:
Kariya SK, Seth NH, Jain M, Wardhan VD. Effect of manual positioning as an adjuvant to intercostal drainage in a 14-year-old child with a known case of SLE and pleural effusion as a subsequent consequence: A case report. Medical Science 2022; 26:ms359e2393.
doi: https://doi.org/10.54905/disssi/v26i127/ms359e2393

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Peer-Review History
Received: 08 July 2022
Reviewed & Revised: 11/July/2022 to 31/August/2022
Accepted: 04 September 2022
Published: 08 September 2022

Peer-review Method
External peer-review was done through double-blind method.

URL: https://www.discoveryjournals.org/medicalscience

ABSTRACT

SLE (Systemic lupus erythematosus) is an autoimmune condition defined by autoantibody generation, immune complex accumulation, anda diverse set of clinical signs and symptoms. SLE is an immunological condition where the body's immune system mistakenly attacks the body's own tissues, causing widespread inflammation and tissue damage in the affected organs. According to an approx calculation, there are 161,000 people with proven SLE and 322,000 as or suspected SLE. Interfaces between genetics, as well as interactions between environmental and genetic factors, should be evaluated as significant risk stratification drivers. It can affect anyone at any age, although it is about 10 times more common in women than in males, with young women between the ages of 15 and 44 being the most affected. SLE has the potential to harm a patient's overall mental, physical, and social abilities. The constraints that patients with SLE face might have an influence on their quality of life. Exercise is difficult for individuals with SLE due to a variety of real and perceived limitations. We also present a case study of a 14-year-old female with SLE, in which we discovered that basic in-bed mobility exercises, breathing and positioning techniques, and cardiovascular (aerobic) training are beneficial to SLE patients. Physiotherapy was also essential in improving their quality of life and reducing secondary problems.

Keywords: Systemic lupus erythematosus (SLE), Pleural effusion, Manual positioning, Physiotherapy, Case report.

1. INTRODUCTION

The most prevalent form of lupus, (SLE) systemic lupus erythematosus, is a model autoimmune condition defined by autoantibody synthesis, immune complex deposition, and a wide range of clinical features. When an immune

system targets its owncells, autoimmune diseases develop, leading to a lot of tissue injury damage in the joints, skin, lungs, brain, blood vessels, and kidneys (Bhaskar and Nagaraju, 2019). According to a conservative estimate, 161,000 people have definite SLE and 322,000 have definite or probable SLE (Lisnevskaia et al., 2014). This can affect anyone at any age, although it is about ten times more common in women than in males, with young women between the ages of 15 and 44 being the most affected. SLE symptoms include pulmonary involvement (symptoms include shortness of breath, pain in the chest, and cough), excessive exhaustion, a vague feeling of uneasiness or sickness (malaise), pyrexia, and lack of appetite. The majority of people with SLE also have pain in the joints arthritis, and arthralgias, which typically affect the Muscle soreness and weakness, in the same joints on sides of the body a vascular necrosis, serositis, and other physical obstacles of physical barriers. Furthermore, those with SLE appear to have a worse cardiovascular capability and muscle strength than the general population. A flat red lesion all over the face that does not hurt or irritate and arises or worsens often when exposed to sunlight, is a distinguishing feature. Because of its shape, of nose's bridge is referred to as a "butterfly rash" calcinosis, vasculitis in the skin, and small red raches termed petechiae are all probable side effects of SLE. Alopecia and ulcers in the moisture lining mucosae of the nose, mouth, and, less frequently, private parts are all probable symptoms (Malaviya et al., 1997).

Interactions between genes, as well as interactions between genes and environmental variables, should be identified as possible factors of health risk in SLE. SLE can have a short- and long-term impact on a person's life (Fan et al., 2020). Early recognition and diagnosis of SLE can assist to reduce the negative effects of the disease and enhance functional health and performance and along with their quality of life. Poor medical care, late diagnosis, inefficient medicines, and non-adherence to therapy regimens may increase the adverse effects of SLE, increasing the risk of increased mortality. SLE can have a negative impact on a person's physical, mental, and social abilities. SLE patients' limitations might have a negative influence on their quality of life, especially once they are fatigued (O'Dwyer et al., 2017). Fatigue is the most common symptom that has a negative impact on persons with SLE's quality of life. Despite advances in therapy choices and increased survival rates, SLE remains an incurable condition. Exercise is difficult for people with SLE due to a variety of actual limitations. As a result, physical therapy plays a critical role in improving their quality of life and reducing secondary consequences.

2. PATIENT AND OBSERVATION

Patient Information

A 14-year-old child has known case of SLE since she was 8-year-old went to a private hospital with a complaint of decreased appetite, fever in the past 3 days, and increased work of breathing in the last one day as narrated by the child's mother, fever got relieved on medication. There investigation was conducted which was suggestive of HB 5.6gram per decilitres, TLC 7300 cells/cubic millimetre of blood, platelets 160000 per microliter of blood and the patient was also recurrently admitted 2-3 times for acute pancreatitis three weeks back with generalized edema. Hence the patient was referred to AVBRH with the same complaintsand got admitted to the pediatric ICU for further management, where 10 units of platelet transfusion were done and one unit of blood was transfused to the patient. She was maintaining saturation on 5liters of O2 via nasal prongs and then later shifted to maintaining saturation off O2 and then physiotherapy call was noted and further treatment was given.

Medication history

Injection ceftriaxone, tablet azithromycin, folic acid tab, calcium tab mycophenolate, and tab of a multivitamin.

3. CLINICAL FINDINGS

Consent was taken by the patient's mother, after which a physical examination was performed. The patient was examined in a half-lying position with sufficient back support. When examined, inspection patient was having red flat scally rashes and generalized edema overall body. The movement of the chest wall was noted to be reduced throughout inspection along with the use of accessory muscles of inspiration and was on 5liters of O2/min via nasal prong i.e., 41% of Fio2. On MMRC grading she graded 3. Cardiovascular findings were noted with a pulse rate of 89 beats per minute and B.P. of 110/80 mmHg. Breathing was a thoracoabdominal type with 18 breaths per minute. The inspectory findings were confirmed by palpation, there was diminished chest excursion on both the sides. Chest expansion revealed 2 cm, 3cm, and 3cm over axillary, nipple, and xiphisternum levels respectively. On auscultation, it revealed reduced air entry bilaterally with crepitations over lower zones of the lung bilaterally. On percussion, we found a stony dull note. Outcome measures were taken and are noted on table 1.

Table 1 showing outcome measures used

Outcome measure	Pre rehabilitation	Post rehabilitation
Fatigue severity scale	43	28
MMRC modified medical research council dyspnoea scale	3/5	2/5
MRS(muscle power strength)	4/5	5/5
NPRS (numerical pain rating scale)	8/10	4/10

Diagnostic assessment

A chestx-ray was done which is suggesting pleural effusion (figure 1) showing blunting of the costophrenic angle, blunting of the cardio phrenic angle, and homogenous opacification bilaterally.

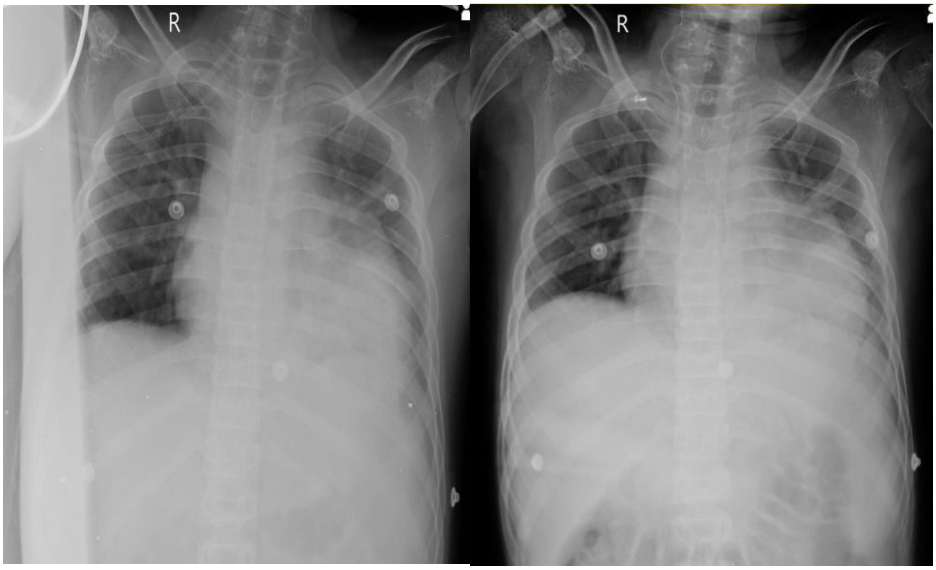

Figure 1 showing blunting of the costophrenic angle, blunting of the cardio phrenic angle, and homogenous opacification bilaterally suggesting pleural effusion.

Blood investigations

On 17th march 2022 HB5.6 gram per decilitres, TLC 7300cells/cubic millimeter of blood, platelets 160000 per microliter of blood. On 18th march after blood transfusion HB 7.9 gram per decilitres, TLC 13200 cells/cubic millimeter of blood, platelet 24000 per microliter of blood.

According to SLE criteria- according to SLICC

4 criteria of them were present that is of clinical (oral ulcers, synovitis involving more than two joints, non scarring alopecia, haemolytic anemia) and one from immunological (ANA) hence suggesting SLE. SLE disease activity index (SLEDAI) score was calculated and found that patient scored 33.

Timeline of Current Episode

Date of admission: 18th march 2022, Date of investigation (X ray): 18th march 2022, Date of blood and platelet transfusion: 19th march 2022, Date of physiotherapeutic intervention started: 21st march 2022, Date of patient shifted to pedratic ward: 29th march 2022, Date of discharge: 6th of April.

Diagnosis

Systemic lupus erythematosus (SLE) with Pleural effusion as a secondary complication

Therapeutic intervention

Patients with SLE benefit from exercise because it reduces muscular weakness while concurrently increasing muscle endurance. Physical therapists can help individuals with SLE manage their symptoms during and after exacerbations. Depending on the systems involved, the patient's need for physiotherapy will differ substantially. Patient education, physical and lifestyle changes, and counselling are all important aspects of SLE management. Physiotherapeutic program is shown in figure 2 and table 2.

Table 2 Day wise physiotherapy management for 2 weeks

Physiotherapy day	Education and counselling	Respiratory physiotherapy	Positioning	Mobilization and strength training
Day 1	✓ SPO2: at 5L O2i.e., 41% of Fio2, HB5.6 gram per decilitres, TLC 7300cells/cubic millimetre of blood, platelets 160000per microliter of blood.	✓ Pursed lip breathing with proprioceptive feedback, dyspnoea relieving positions were explained. .	✓ Supine lying position.	✓ In-Bed Mobility Exercises. UL- as flexion, extension, adduction, abduction. (10 rep of 1 set) LL-ankle toe movements, heel slides, straight leg raise in gravity eliminated positions. (10 rep of 1 set)
Day 4	✓ SPO2: at 2L O2 i.e.,29% of Fio2, HB 5.6 gram per decilitres, TLC 7300 cells/cubic millimetre of blood, platelets 160000 per microliter of blood.	✓ Pursed lip breathing, paper blowing exercise, diaphragmatic breathing with proprioceptive feedback.	✓ Supine lying position and. semi-fowlers position	✓ In-Bed Mobility Exercises. UL- as flexion, extension, adduction, abduction. (10 rep of 1 set) LL-ankle toe movements, heel slides, straight leg raise in against gravity positions. (10 rep of 1 set) bed side sitting and strengthening exercises according to patients 1 RM.
Day 8	✓ Spo2 91% at room air HB 7.9 gram per decilitres, TLC 13200 cells/cubic millimetre of blood, platelet 24000 per microliter of blood.	✓ Pursed lip breathing, paper blowing exercise, diaphragmatic breathing with proprioceptive feedback, incentive spirometer 300 cc/sec with10 sec hold.	✓ semi-fowlers position.	✓ Out-of-Bed Mobility Exercises standing for 3 -4 minutes, spot marching, walking with assistance for 10 min.

Day 12	✓ Spo2 95% at room air HB 7.9 gram per decilitres, TLC 13200cells/cubic millimetre of blood, platelet 24000 per microliter of blood.	✓ Pursed lip breathing, paper blowing exercise, diaphragmatic breathing with proprioceptive feedback, incentive spirometer 600 cc/sec for 10 sec holds.	✓ semi-fowlers position.	✓ Out-of-Bed Mobility Exercises Independent ambulation for 10 min.
Day 16	✓ Spo2 98% at room air HB 7.9 gram per decilitres, TLC 13200 cells/cubic millimetre of blood, platelet 24000 per microliter of blood.	✓ Pursed lip breathing, paper blowing exercise, diaphragmatic breathing with proprioceptive feedback, incentive spirometer 900 cc/sec for 5 sec holds.	✓ semi-fowlers position.	6-minute walk test was calculated and which came out to be 312 meters covered (walked) by patient.

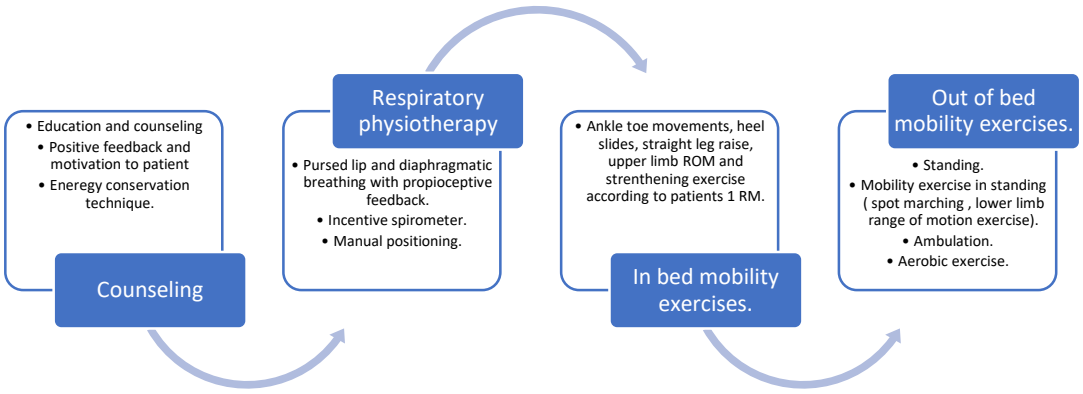

Figure 2 Physiotherapeutic program given in our patient.

Patient Education

It is critical that individuals with skin rashes receive sufficient knowledgeand ways to care for their skin and avoid further skin breakdown. Patients with SLE should be well-informed (including handouts), about the disease's pathology, the possibility of organ involvement, and the significance of therapy and compliance monitoring. Techniques for stress reduction, a good amount of sleep, workouts, and enough emotional support was promoted. A proper Diet was recommended, avoiding sprouts and having a vitamin D-rich diet. We taught patients about proper energy conservation strategies and the proper technique to prevent joints that are prone to harm. We also informed the patient about indications and symptoms that indicate SLE progressions, such as avascular necrosis, renal involvement, and neurological involvement. Manual positioning is different from regular body positioning in that it is used to improve cardiopulmonary function and oxygen transfer. Positioning enhances the usual physiological action of gravity and changes oxygen transport which is a priority. Gravity and manual placement have the greatest impact on lung distribution and ventilation. Body location, on the other hand, changes

both intraregional and interregional factors of ventilation-perfusion and their matching. All respiratory care necessitates the use of the positioning. As a result, they simply placed patients in manual positions like as supine, prone, and semi-fowler.

In patients with unilateral lung illnesses, positioning causes considerable changes in arterial oxygenation. Changes in position and, as a result, the gravity may effect, among other things, produce changes in respiratory function at differing levels. Changes in body position aid to facilitate and promote secretion clearance, as well as improving improve breathing perfusion. One study found that the semi-fowlers position was superior to the two other positions that are prone and supine lying. The functional residual capacity and tidal volume are enhanced in the semi-fowlers position, and oxygen transportation is more visible. As a result, we placed in a semi-fowlers position, which improved clinically and numerically in patients with pleural effusion when used in conjunction with intercostal drainage. Because her pleural effusion was self-resolving, we initially provided her breathing techniques like pursed-lip and diaphragmatic breathing to help her clear it and along with it we also taught her paper blowing exercise which is shown in figure 3. After a week, the patient was moved to a ward and given an incentive spirometer (shown in figure 4), which she was able to use up to 900cc/sec.

Figure 3 showing paper blowing activity

Figure 4 patient doing incentive spirometer

We demonstrated dyspnea-relieving poses, which assisted her in releasing her dyspnea. The in-bed mobility that is basic active activities such as ankle-toe movements, heel slides (figure 5), and straight-leg raises was started first in gravity-free positions, and when patients began to feel less fatigued, active workouts in against gravity positions with static and dynamic hamstring and quads exercises were started. Upper limb mobility activities such as flexion, extension, adduction, and abduction were also started shown in (figure 6). When the patients' strength had improved enough, we placed them in

bedside sitting and began strengthening exercises with a half-liter water bottle based on their 1RM, then a one-liter water bottle shown in (figure 7), and finally with the use of TheraBand.

Following in-bed mobility exercises, we began out-of-bed mobility exercises such as standing for 3-4 minutes, spot marching and walking with assistance. When the patient was transferred to a ward, the patient was taught to ambulate independently, and spo2 and B.P were measured before and after ambulation. During ambulation, the patient was told that if she felt dysponic, she should sit for a minute and practice pursed-lip breathing.

Aerobic Exercise

Generalized exhaustion is the most common problem in individuals with SLE, which might limit their activities throughout the day. Relaxation techniques are less effective than graded aerobic exercise regimens in reducing fatigue in SLE patients. The exercise regimen consisted of 30-50 minutes of aerobic exercise (spot marching/walk) at a rate of heart that was equal to sixty percent of the individual's peak oxygen intake. Aerobic and range-of-motion/strengthening exercises can help people with SLE improve their levels of energy, cardiorespiratory endurance, functional ability, and muscular endurance (aerobic exercise for twenty to thirty minutes at seventy to eighty percent of their maximum heart rate, three times a week for fifty minutes sessions).

Figure 5 showing assisted heel slides.

Figure 6 showing active UL exercise (flexion)

Figure 7 showing upper limb strengthening exercise through 1 litter water bottle.

4. DISCUSSION

Aranow et al., (2021) conducted a study in which patients were given either transcutaneous auricular vagus nerve stimulation, or sham stimulation (SS) to help with pain relief and tiredness improvement in SLE patients. Wu et al., (2017) researched that because fatigue being the commonest and unpleasant sign of SLE, the goal was to examine and see knowledge regarding the efficacy of exercise training in the treatment of fatigue in people with SLE. The study found that, twelve weeks of exercise program and exercise in supervised manner reduced weariness effectively.

Middleton et al., (2018) found in the Yoga literature the potential toenhance physical strength and bodily flexibility, reduce stress, depression, and chronic pain, increase sleep patterns, and improve overall well-being and quality of life through yogic activities in people with SLE. When compared to other people with SLE, participants showed improved balance, body awareness, and tolerance for a faster-paced yoga class. Yoga has also been demonstrated to improve quality of life and fatigue in people with SLE.

We report a case study of 14 year old female with known case of SLE in we found that basic in and out of bed mobility exercises, breathing and positioning technique and it aerobic training is beneficial for SLE patients secondary to pleural effusion.

5. CONCLUSION

SLE affects a person's physical, mental, and social abilities. Patients with SLE may experience a decrease in their quality of life as a result of their limitations, especially if they are exhausted. Despite advances in therapy choices and increased survival rates, SLE remains an incurable disease. Exercise is difficult for people with SLE due to a variety of real and imagined limitations. As a result, physiotherapy played a significant role in improving their quality of life and reducing secondary complications by providing them with the appropriate amount of treatment, which included basic in and out of bed mobility exercises, breathing and positioning techniques, as well as aerobic training, which helped them gain confidence.

Patient Perspective

I had known for a few years that I had systemic lupus erythematosus, but I was horrified to learn how serious the condition might be once it began to impair my lungs. This has been a unique experience that has taught me a great deal about my illness. I consider myself quite fortunate to have healed, and I am extremely relieved and it gains enough confidence.

Informed consent

All individuals who took part in the study gave their written and oral informed consent. All individual individuals whose identifying information is included in this manuscript provided additional informed consent.

Acknowledgment

We thank our patient and their caregivers for their support during treatment sessions.

Author's contributions

Our every author contributed equally in this case report.

Abbreviations

SLE:	Systemic lupus erythematosus.
SLICC:	Systemic lupus international collaborating clinics classification criteria.
SLEDAI:	Systemic lupus erythematosus disease activity index.
HB:	hemoglobin.
TLC:	total leucocyte count.
ANA:	antinuclear antibody.

Funding

This study has not received any external funding.

Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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