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A-38-Years-Old Woman a Case of SLE Having Four Successful Replacement Therapy: Bilateral Hip Replacement for Bilateral Avascular Necrosis of Femoral Head, Maintenance Hemodialysis Followed by Living Donor Kidney Transplant for End Stage Renal Disease

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ABSTRACT

CASE SUMMARY

A-38-years-old woman, a case of SLE, had avascular necrosis of both femoral heads and end stage renal disease 5 years and 8 years after diagnosis. Therefore, maintenance hemodialysis was initiated. Total hip replacement was done one after another successfully. Three months after replacement of hip, living donor kidney transplant was done with success. We reviewed the current literature.

KEYWORDS: SLE, bilateral avascular necrosis of femoral head, maintenance hemodialysis, living donor kidney transplant, end stage renal disease

ARTICLE DETAILS

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INTRODUCTION

SLE is a common autoimmune disorder; and reported SLE prevalence and incidence vary considerably due to inherent population differences and methodological inconsistencies (Barber et al., 2023). According to WHO regions, the pooled incidence of the American region was 10 per 100,000 inhabitants (Fatoye et al., 2022). The prevalence was increasing according to Taiwan study (Leong et al., 2021).

Avascular necrosis is due to ischemic death of the bone involving typically the femoral heads. Osteonecrosis or avascular necrosis is related with dosage and duration of steroids. Bilateral avascular necrosis of femoral head is commonly seen in deep divers, free fall trainer, diabetes mellitus, SLE, alcohol, smoking, sickle cell disease, hepatitis C infection & interferon therapy (Liu et al., 2022), COVID-19 infection, and HIV infection.

Systemic lupus erythematosus is known to be one of the leading causes of end-stage renal disease; renal involvement is common in them (Z. Khan et al., 2023). Increased mortality and morbidity from renal damage was higher in patients with SLE compared to general population (Reppe Moe et al., 2019) (Choi et al., 2019). Spanish study found that type of glomerulonephritis provides valuable information about risk factors for renal failure in patients with SLE at the time of renal biopsy (Leong et al., 2021).

CASE PRESENTATION

The patient had facial puffiness and tightening of fingers in 2012; she was 26 years old at the time of diagnosis. Later, she also noticed a photosensitive butterfly facial rash and arthralgia involving small joints of hands particularly proximal interphalangeal joints and large joints. There was no history of fever, oral ulcers, significant hair loss, abnormal behavior, hematuria, proteinuria, reduced urine output, or significant anemia at that time. Under the care of a rheumatologist, she was treated with parenteral methylprednisolone 500 mg monthly for 6 months, followed by oral medixon 16 mg - 4 mg daily. The total duration of steroid treatment was over 10 years.

She also had pain in her hip and difficulty walking in 2017 ie five years after diagnosis of SLE. And it was getting worse; X'ray showed features of avascular necrosis of both femoral heads with severe destruction of hip joints and sclerosis in early 2023. Photo 1 & 2 shows X'ray pelvis showing AVN. She had COVID '19' infection in 2021 and recovered well.

In 2020, she had poor appetite, weight loss and unexplained anemia; serum creatinine was very high. As kidney size was small on both side, renal biopsy was not done. Therefore, she was in state of end stage renal disease due to SLE; renal replacement therapy was initiated. She was doing hemodialysis through left brachio-cephalic arterio-venous fistula for 3 years.

For avascular necrosis of both femoral heads, total hip replacement was done to right side in July 2023 in Aung Ban; and, left side was done in November 2023 in Yangon. Both surgeries were uneventful; both pain and range of movement in both hip joints were better. The patient did not need to take analgesics and she can walk with normal gait. Photo 3 shows X'ray pelvis showing prosthesis in both hip joints.

Remaining diuresis was 100 cc/day. Her appetite was normal. From 2020 onwards, there was no evidence of activity of SLE; small joint pain, skin rash or alopecia. She was married with no child. She had secondary amenorrhea for one year. There was history of abortion one time.

She was blood group 'B' Rh positive; she received 10 units of blood transfusion for anemia. And thrombocytopenia. Echocardiogram in January 2024 showed LVEF 40%; dilated left atrium, right atrium and right ventricle; severe pulmonary hypertension (RVsP 60.81mmHg); severe mitral regurgitation; and, mild left ventricular hypertrophy. Sidenafil was added for pulmonary hypertension and anemia was corrected. She was on frusemide, eltrobopag, iron, sidenafil and erythropoietin.

The blood results prior to transplant were as follows: hemoglobin 8.6 gm%; total WBC 5.8 $X10^9$ /L; platelets 131 $X10^9$ /L; total protein 60 mg%; albumin 40 mg%.

She received living kidney from her elder sister. Regarding immune risk for getting kidney from her sister was calculated as 'intermediate risk' because she had 10 units of blood transfusion; she had one attack of abortion; CDC cross match was Normal B cell Positive (1:1); Flow cytometry was 'Both T and B cell – Negative'; Donor Specific Antibody was DRB1*04:04 (MFI 912), DRB5*01:01 (MFI 904); and, CREG was Multiple CREG in A/B/C/DR antigen. Therefore, she was given ATG to reduce risks. Renal transplant was done in April 2024 in Aung Ban. She was on steroid, tacrolimus and mycophenolate mofetil. Renal transplant was uneventful too. Now, she was 3 months post-transplant and doing well.

DISCUSSION

In this patient, the age of onset was 26 years. And, she developed pain in hip joint 5 years later. Regarding the duration of illness and onset of avascular necrosis in patients with SLE, Khan et al found that avascular necrosis is a relatively early complication occurring within 4 years of illness in SLE patients with a young age at onset (A. Khan et al., 2023). In this case, the general course of avascular necrosis was supportive evidence for Khan's report.

Multiple theories to explain why and how avascular necrosis occurs in SLE, but an exact mechanism has yet to be unraveled (Gurion et al., 2015). Most studies reported that avascular necrosis of the femoral head was related with steroid therapy (Hurley et al., 1974) (Long et al., 2021)

(Hussein et al., 2018); however, others were contradictory (Adikari et al., 2016).

The association between steroids and avascular necrosis of the femoral head was studied in children with SLE by Hurley et al. They compared two groups for 9 years: a group of patients with glomerulonephritis treated with corticosteroids and a group with glomerulonephritis treated with azathioprine. And, they found that avascular necrosis of the femoral head was related to the duration of daily steroid therapy rather than the total duration of steroid treatment; this was not true for azathioprine. In addition, the occurrence of avascular necrosis of the femoral head was recorded in their patients while they were on alternate-day steroid therapy; and, it was coincided with a relapse. Therefore, they concluded that development of avascular necrosis of the femoral head was determined by underlying disease. They also reported that the symptoms of avascular necrosis of the femoral head are insidious and unpredictable; and, it predates the radiologic diagnosis by weeks to months (Hurley et al., 1974).

The development of avascular necrosis depended on pattern of steroid, dosage and duration of therapy. The study done in Taiwan enrolled nearly 1,500 children with newly-diagnosed SLE between 2005 and 2013; nearly 3% developed symptomatic avascular necrosis during 7 years. They found that high daily doses of prednisolone were associated with a significant risk of avascular necrosis whereas the use of hydroxychloroquine conferred an advantage. They suggested that the judicious use of corticosteroids combined with hydroxychloroquine might be a promising preventive strategy for avascular necrosis (Tsai et al., 2020). Moreover, Dogan et al confirmed their finding; an alternate day steroid regimen may decrease avascular necrosis frequency in SLE patients (Doğan et al., 2020). In addition, Taiwan study on adult autoimmune disease cases revealed that male sex, systemic lupus erythematosus, alcoholism, mean daily corticosteroid over 7.5 mg and a total cumulative dose of corticosteroid 0 to 5 g were independently associated with the development of avascular necrosis in autoimmune patients ("Epidemiology and Risk Factors Associated with Avascular Necrosis in Patients with Autoimmune Diseases: A Nationwide Study FAU - Tsai, Hsin-Lin FAU - Chang, Jei-Wen FAU - Lu, Jen-Her FAU - Liu, Chin-Su," 2022). In this patient, daily dose of steroid was high; medixon 16 mg. And, total duration was over 10 years. Therefore, having avascular necrosis in this patient five years after diagnosis of SLE was not strange according to their studies.

Cheng et al did study on four thousand cases with SLE, only 3% of them had avascular necrosis during follow-ups 2 years. They illustrated that patients with SLE onset age ≤ 30, arthritis, existing organ damage (SDI ≥ 1) at registration, positive anti-RNP, and high glucocorticoid maximum daily dose at registration are at high risk for avascular necrosis; and they require attention (Cheng et al., 2023). However, the occurrence of avascular necrosis increased with longer follow up; it was 9% in one study doing follow up for 9 years. Those with avascular necrosis had younger age at SLE diagnosis (27 years); fever; malar rash; serositis; renal involvement and hemolytic anemia were found more frequently in the avascular necrosis group compared to non- avascular necrosis group. The steroids had an association with avascular necrosis development in a dose-dependent manner; and pulse steroids did not increase the risk of avascular necrosis (Bulat et al., 2022). This patient had malar rash, young age at onset, steroid therapy and blood transfusion reflected hemolytic anemia; therefore, she was having high risk for avascular necrosis.

This patient had bilateral avascular necrosis of femoral heads. Reported cases with bilateral avascular necrosis of femoral heads had various etiologies: either exogenous or endogenous steroid related (Dharmshaktu et al., 2016) (Ha et al., 2019) (Joseph et al., 2022); lipid related (Fusillo & Nguyen, 2023); Fibrous dysplasia related (Lee et al., 2017); SLE related (Adikari et al., 2016), HIV related (Kamat et al., 2022) and COVID 19 infection related (Kamani et al., 2022). Adikari reported steroid naive SLE presenting as avascular necrosis. 26 years old female with bilateral avascular necrosis; their patient did not get steroid therapy. Therefore, they postulated that avascular necrosis could be an early musculoskeletal manifestation of systemic lupus erythematosus even in the absence of corticosteroid administration (Adikari et al., 2016).

CONCLUSION

Awareness of avascular necrosis of femoral head is important in patients with SLE. It needs long term regular follow up. To reduce the incidence of avascular necrosis, low dose of steroid therapy with steroid sparing drugs are preferable. End stage renal damage should be managed with renal replacement therapy. Low dose steroid should be considered to prevent osteopenia/osteoporosis and osteonecrosis in this patient after renal transplant.

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ETHICAL CONSIDERATION

Informed consent was taken from patient.

CONFLICT OF INTEREST

There was no COI.

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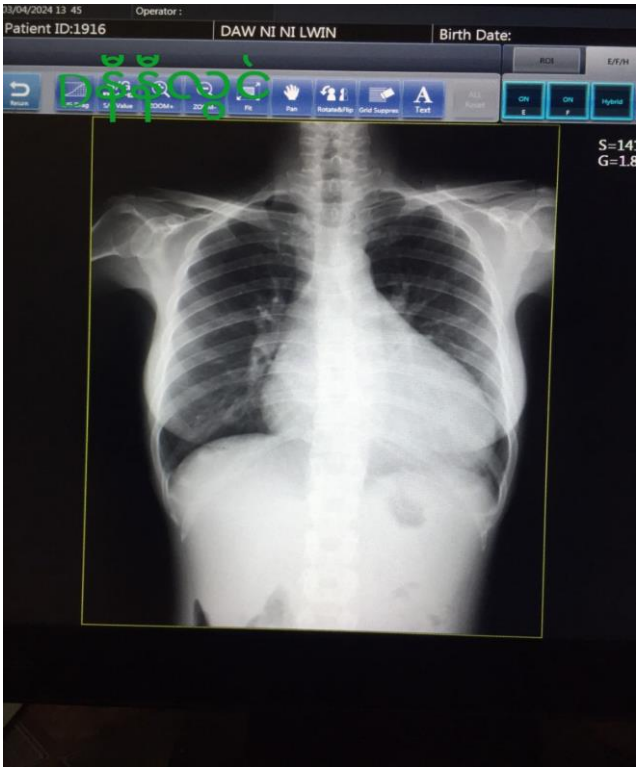

Photo (1) Chest radiograph showing hugely dilated heart and prominent right pulmonary artery.

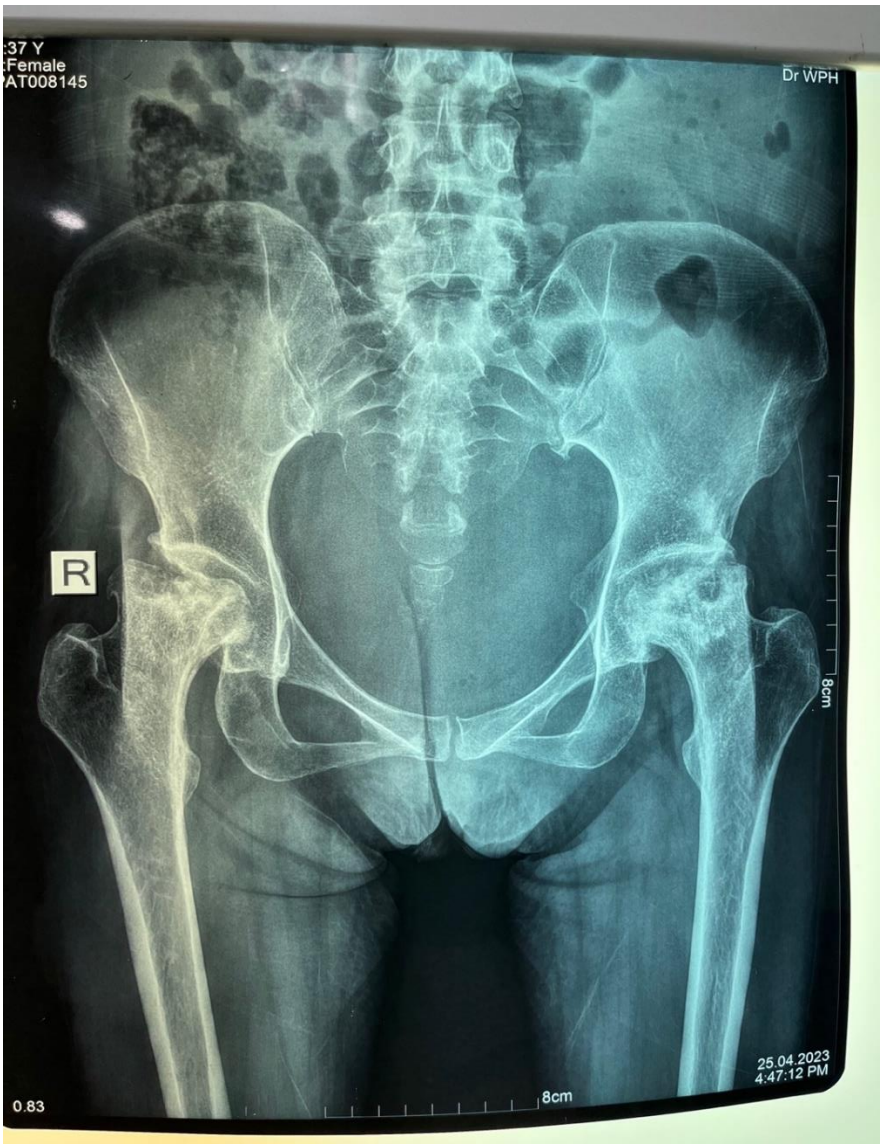

Photo (2) Xray pelvis showing avascular necrosis of both femoral heads

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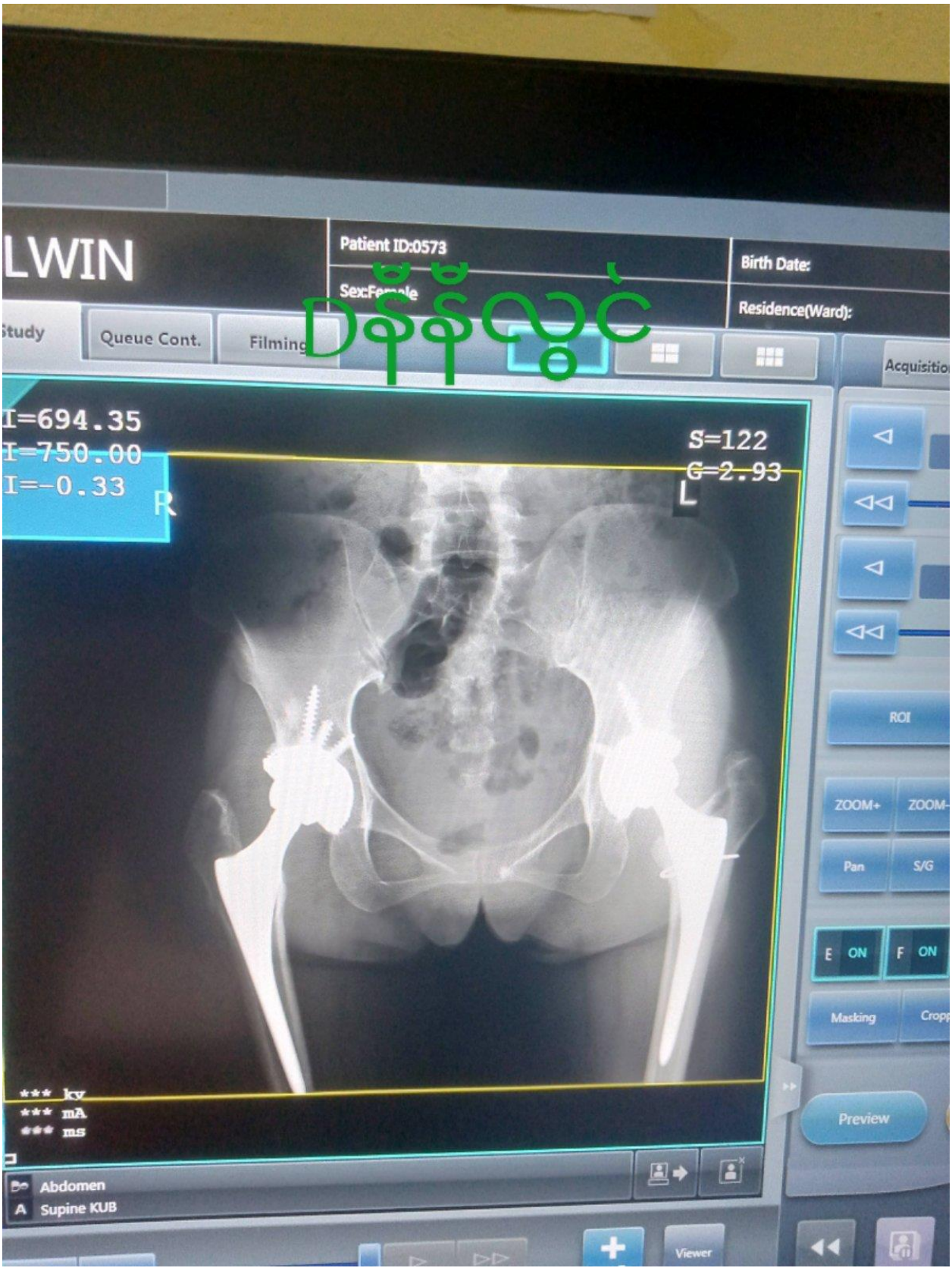

Photo (3) Xray pelvis showing total hip replacement

Photo (4) Patient is smiling 24 hours after transplant

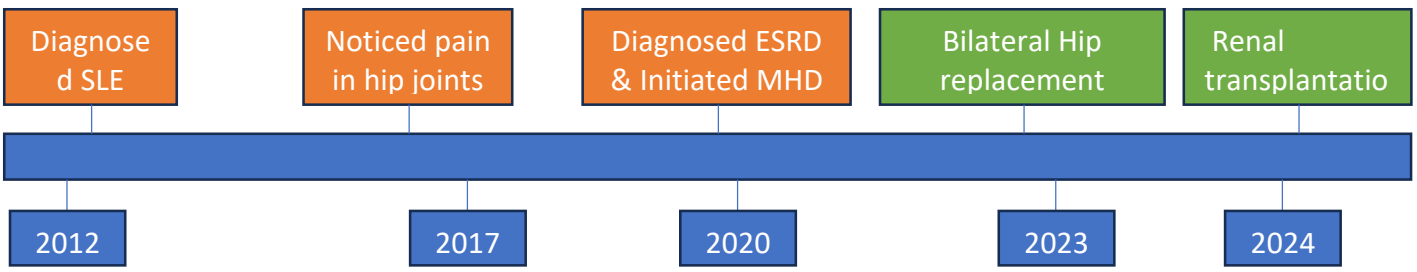

Figure (1) Time line of course of disease in this patient and treatment