Pathophysiology of systemic lupus erythematosus

Introduction

This essay will explore the pathophysiology relating to a call I attended while on practice placement as a student technician. The initial call details were that it was a 45 year old female in pain. On our arrival the patient was sat in a chair and was breathing rapidly and had a very flushed face. After introducing ourselves and gaining the patients consent we then proceeded to take her basic observations and take her history. Most of her observations were within acceptable limits however her blood pressure was slightly high, she had a raised pulse at 120 beats per minute and slightly high temperature at 38 degrees Celsius. On questioning the patient had a localised pain score of 8/10 in her back and a pains in her joints and muscles with a pain score of 4/10. When questioned about her medical history, she stated she had a condition called systemic lupus erythematosus. This is not a condition I had heard of before I, therefore, questioned her more about it.

Differential Diagnosis

A 20 year-old women patient presented with fatigue, heart palpitations and anxiety. Examining her medical history including her ANA, CBC, skin biopsy of lesions on her legs, complementary series, and anti-DNA antibody test, reveals vessel vasculitis. The results indicate hematocrit: 10. 5 g/dL. ANA: 1. 640, an elevated Anti-DNA antibody test, 3. 8 million/mm ^{3} for red blood cell count, 6000/mm ^{3} of White blood cell count, 35% for Hematocrit, 138, 000/mm ^{3} for platelets, 6000/mm ^{3} for White blood cell count, Decreased C $_3$ level at 43 mg/dl for the Complement assay, and a decreased C $_4$ level a 14 mg/dl (Appendix A). The patient’s rheumatoid arthritis factor had been found

to be negative with <60u/ml with the rate of sedimentation at 62 mm/hr. On review of the patient's medical history revealed that the patient's ANA test had tasted positive at 1: 640 and her LE cell pre or erythematosus test had had been found to be negative(normal and negative test without LE cells). Reviewing the patient's history revealed that she started experiencing anxiety, fatigue and heart palpitations when she was still pregnant and that when she visited a physician, she was told this was due to stress. However, her symptoms only became worse after she conceived another child. She was reported to have experienced premature contractions, headaches, increased fatigue, and swelling of her legs. The physician prescribed bed rest. Shortly after giving birth to her third child, the patient began experiencing puzzling and new symptoms. Her knees and ankles start swelling, complained of joint pain in her knees, wrists, elbows, and fingers. During winter the patient started feeling painful and discolored whenever exposed to cold. After all the tests were competed, a rheumatologists concludes that though the test were still pending, he was sure that the patient had systemic lupus erythematous.

Epidemiology

According to Somers et al (2007) approximately five people in every ten thousand suffer from systemic lupus erythematosus. Ninety percent of patients who are diagnosed with systemic lupus erythematosus are female (Ginzler&Tayar 2012; Blank et al 2009). It most commonly develops in women aged between 20 and 40 although anyone of any gender and age can develop it at any time. With regards to ethnic origin systemic lupus erythematosus is more prevalent in those with Afro-caribean, Asian or

Chinese ancestry. Although there is a possibility of having a genetic pre-disposition to the disease only 3 of 100 children of those diagnosed with systemic lupus erythematosus will go on to develop it. According to the research 90% of those suffering from System lupus erythematous of which African American are 44%, 32% are whites and Latin American are 23%. According to National Health and Nutrition Examination Survey (2004) a survey in which it was observed that 100% of patient with System lupus erythematous were receiving treatment.

Aetiology

System lupus erythematous is an autoimmune disease that deals with fighting bacteria in the human system. They are several causes of System lupus erythematous they include Genetics where members of the family have lupus this condition will often manifest; it can also be caused by Environment such as trauma, ultraviolet rays and also emotional stress, Drugs reaction is also another cause of lupus where a patient is treated for a longer period of time such as 38 or more medications, Gender and Hormones is another cause of System lupus erythematous it is proved that it mostly affects women than men especially when they are in menstrual periods or in their pregnancy, it is said to occur nine times more to women as compared to men. Aetiology It is used mostly in the field of medicine in other words it is about causes of a disease or its origin. it includes the factors or the conditions that predispose when a certain disease and disorder is occurring. It focus mostly on the study of epidemiology, an example of Aetiology is scurvy which is said to be caused by lack of fresh vegetables that provides vitamin C.

The risk factor is matched to patients in terms of sex, age and also state, risk also increased with time that is with history. The risk was determining according to autoimmune disease (AD) among the first-degree relatives (FDR) and later measured as an odds ratio (OR) where the equation technique method was applied. The risk is said to double in female as compared to male.

Pathophysiology

Patients who suffer from this condition have abnormalities when it come to their immune system this includes the B cell function, apoptosis and also the T cell function. System lupus erythematous mostly attacks the blood vessels, the skin, the heart, nervous system, liver, lungs and the kidney. Unfortunately when System lupus erythematous persist it may result into serious complication such as stroke, heart inflammation, lung damage, blood clots and more so to female it may result into miscarriage or pregnancy complications. Research shows that the exact cause of immune deregulation is not yet clear but it may be as a result of interference of endogenous metabolism that affects the functioning of antigen in the human system.

The abnormalities caused by System lupus erythematous may vary from one ethnic group to the other for instance East Asians who have this problem they have extra cytotoxic T lymphocyte antigen-4 while the Whites their abnormalities is observed through having more Fc-Y receptors. Deposition in immune complex is one of the pathology in the lupus which triggers the normal functioning of the cells where the Autoantibodies work in opposite direction with nuclear self-antigen. The most affected nuclear antigen is

histone, Smith, native DNA, U1ribonuclear protein, ribosomal RNP and denatured DNA. For effective diagnosis of System lupus erythematous it is of essence to deal with specific autoantibodies in order to treat the root cause of the disease.

The key features of Systemic lupus erythematous include; blood clotting problem, headaches, severe fatigue, weight loss, myalgia, painful or swollen joints, hair loss, rash on cheeks and noise and also Raynaud’s syndrome that is fingers turning blue or white. Other features will also depend of the areas that have been affected such as the skin, the heart or the digestive tract.

Pharmacology and associated treatment

Treatment of System lupus erythematous is more individualized and it always depends in manifestation of the symptom, the disease severity and more importantly the organ affected, it involves a number of diagnostic test in which screening yields the best result. The process involves the blood tests including antibody tests, also urinalysis and chest X-ray this is mostly done by Rheumatologists whose area of specialization is autoimmune diseases and also soft tissue treatment. The prescription in treatment process may include steroid creams to apply in rashes, antimalarial drugs for the skin and joints, anti-inflammatory medications also for the joint pain and stiffness and also corticosteroids that minimize immune response. The duration taken for the therapy will majorly depend on the patient’s response.

Other intervention include an advice from the doctor regarding the patient lifestyle and diet may be of vital importance this may help the patient to avoid some diet and minimize lifestyle related stress. It also calls for the

patient to working with support group or even trained counsellor for one to manage the illness in situation where it is caused by emotional toll.

Musculoskeletal is a form of System lupus erythematous and it can be manifested as arthritis or arthralgia in which the patient expresses it as stiffness and pain, when it occurs in System lupus erythematous it can be inform of migratory or transient it is hard to be diagnosed since it may be present when the patient makes the appointment with a doctor only to be resolved in the process of evaluation. When it appears in the system lupus erythematous it has fewer erosions and also fixed deformities unlike rheumatoid arthritis. Musculoskeletal may also occur inform of periarticular inflammation that affects the tendon sheaths, the illness causes the patient to experience coexisting fibromyalgia that results to poor sleep, chronic disease, inactivity , mood problems and depression. There is also the possibility of around 4% of the patient to be suffering from myositis of which it can be examined through biopsy, myositis and myalgia are almost similar but their treatment approach is quite different.

Osteonecrosis is another component of musculoskeletal in the system lupus erythematous that results to painful joints to the patients especially knees and the hips, in this condition the patient needs to take corticosteroids during the first 6 -18 months under medication.

The medicine commonly used to treat this condition include Glucocorticoids, it can be administered alone or in combination with immunosuppressive agents. The patient may take 40 to 60 mg/d for severe condition and 10mg/d for those in mild condition. It is advisable for the shortest duration to be

taken while the patient is using the drugs to avoid long-term complication. Glucose levels should always be checked after every three months while bone density and cholesterol level requires to be checked annually.

Antimalarial is also used in the treatment of System lupus erythematous and particularly arthralgia, the most commonly used is Hydroxychloroquine since it does not cause gastrointestinal reactions.

Conclusion

It is important for early diagnosis to be done in order to avoid severe complication of System lupus erythematous, Research indicates that in 1950s people with System lupus erythematous lived less than five years after diagnosis but today more than 90% now survive for over ten years. Early treatment makes the patient lifespan to prolong and minimize medication expenses.

References

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Appendix A

The following lab results are recorded:

- ANA: 1: 640 (normal: No ANA detected in a titer with a dilution 1: 32)
- Anti-DNA antibody test: Elevated (normal: low or none)
- Complement assay: Decreased C_3 level at 43 mg/dl (normal: 55–120 mg/dl) and decreased C_4 level at 14 mg/dl (normal: 20–50 mg/dl)
- Red blood cell count: 3. 8 million/mm^3 (normal: 4. 2–5. 4 million/mm^3 for females)
- Hemoglobin: 10. 5 g/dL (normal: 12–16 g/dL for females)
- Hematocrit: 35% (normal: 37% to 47% for females)
- White blood cell count: 6000/mm^3 (normal: 5000–10, 000/mm^3 for females)
- Platelets: 138, 000/mm^3 (normal: 150, 000–400, 000/mm^3)