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Acute Cutaneus Lupus Erythematosus in a Welder: a Case Report

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Abstract

Background: Cutaneous Lupus Erythematosus (CLE) is a diverse group of autoimmune connective tissue disorders localised to the skin that can be associated with Systemic Lupus Erythematosus (SLE). Chronicity and recurrency of this disease can cause a significant reduction in worker productivity, absenteeism and medical expenses
Objective: To identify cutaneous lupus erythematosus in welder is an occupational diseases or work aggravated diseases which will be implemented through seven step of ocupational disease.
Case Presentation: A 42-year-old patient came with complaints of red patches on the face, scalp, and hands since 3 months ago. the patient was previously treated at an internal medicine polyclinic and was diagnosed with SLE. The patient was then referred to the dermatology department of allergy and immunology and was diagnosed with acute cutaneous lupus erythematosus.
Discussion: According to the PERDOKI's seven step guideline to diagnosis occupational disease, in this patient is declared as work aggravated disease. UV light is a major environmental triggering or precipitating factor in cutaneous lupus erythematosus(LE). Avoiding or reducing UV light exposure from the sun and from work are essential to prevent recurrence.
Keyword: cutaneus lupus eryhtematosus, welder, UV light

Abstrak

***Latar Belakang**: Kutaneus Lupus Eritematosus adalah penyakit autoimun dengan manifestasi pada kulit dan memiliki asosiasi dengan Lupus Eritematosus Sistemik. Sifatnya yg kronis dan rekuren dapat menyebabkan penurunan produktivitas pekerja, menyebabkan absenteeism dan biaya medis yang cukup besar.*
***Tujuan:** Untuk mengidentifikasi apakah Kutaneus Lupus Eritematosus pada welder termasuk penyakit akibat akibat kerja, diperberat akibat kerja maupun bukan penyakit akibat kerja yang akan diimplementasikan melalui tujuh langkah diagnosis okupasi*
***Presentasi Kasus**:Pasien usia 42 tahun datang dengan keluhan bercak merah pada wajah, kulit kepala dan tangan sejak 3 minggu yang lalu. Pasien sempat berobat ke poli penyakit dalam dan di diagnosa menderita SLE. Pasien lalu dirujuk ke poli kulit divisi alergi dan imunologi dan di diagnosa menderita Kutaneus Lupus Eritematosus*
***Diskusi:** Berdasarkan tujuh Langkah diagnosis PAK dari PERDOKI, pasien ini dinyatakan penyakit diperberat akibat kerja. Sinar UV merupakan faktor pemicu pada kasus kutaneus lupus eritematosus. Pada kasus ini mengurangi paparan sinar UV dari matahari maupun dari pekerjaan penting untuk mencegah kekambuhan*
***Kata kunci**: kutaneus lupus eritematosus, pengelas, sinar UV*

Background

Lupus erythematosus (LE) is an autoimmune disease with a broad spectrum of manifestations. Cutaneous lupus erythematosus is divided into acute cutaneous lupus erythematosus (ACLE), subacute cutaneous lupus erythematosus (SCLE) and chronic cutaneous lupus erythematosus (CCLE).[1]

The Lupus Foundation of America estimates that 1.5 million Americans, and at least five million people worldwide, have a form of lupus. [2] A Study in denmark revealed that incidence rate of CLE was 2.74/100.000 with female:male ratio of 4:1 and first appears at the age of 15-55 years.from 12.047 CLE Patient followup about 8% become SLE.[3] In Indonesia doesn't have data about the exact prevalence of CLE or SLE, but it was estimated incidence rate 0.9-31/100.000. Cutaneous lupus erythematosus has an impact on the quality of life of patient.[4] There is a study that says that cutaneous lupus causes limitations in work by as much as 45%. Survey found 55 percent of lupus patients reported a complete or partial loss of their income because they no longer are able to work full time due to complications of lupus. One in three have been temporarily disabled by the disease, and one in four currently receive disability payments.[2]

For people with lupus, they have to considerate the working areas. In outdoor areas with direct sunlight exposure can exacerbate the symptoms. Some work can also trigger or aggravate the symptoms like working as a welder. Welder is an expert who has expertise in the field of welding, joining two metals, filling or repairing holes in metal construction through the use of intense heat or gas. Welders are often needed in various industries, manufacturing and construction. This job has various kinds of exposure, one of which is exposure produced by welding equipment in the form of UV light which has an impact on various skin health.[5]

Case Presentation

A 42-year-old patient came with complaints of red patches on the face, scalp, and hands since 3 months ago. the patient was previously treated at an internal medicine polyclinic and was diagnosed with SLE. Initially, red patches on both cheeks and spread to his scalp and his hand. When exposed to the sun, the red spots was flared up and getting better at night and he also complain his hair getting white and loss in some area. The patient's fingernails have black spots. On physical examination, Erythematous-hyperpigmented plaques with classic butterfly rash configuration, nasolabial sparring on his face. Localized alopecia was also found in this patient. In his finger we found Dim, lenticular-numular, circumscript, confluent-discrete erythematous plaques. On dermoscopy we found structureless area, linear blood vessels, telangiectasia with squama on his scalp and face region. Periungual telangiectasia was also found on his nail. On histopathology founding we found a perivascular mononuclear cell infiltrate with subsequent involvement of the epidermis and appendages.

The patient was then referred to the dermatology department of allergy and immunology and was diagnosed with acute cutaneous lupus erythematosus. Patient worked as a welder for 12 years in a construction company, his complaints increase especially when the patient after work. skin complaints are reduced, for example when the patient is off duty for a few days. He stated that he occasionaly use helmets or welding clothes due to its inconvenient. He has been told that his work as a welder exacerbates his symptoms, but he still wants to work as a welder. The patient was treated with methylprednisolone, hidroxy chlororoquin, methotrexat and mometasone cream for topical. He also advised to use sunblock everytime he goes outside and wear helmet and clothes that can block uv radiation. Several weeks later, after concerning occupational exposure and continuing the treatment, symptoms are well controlled.

Discussion

To diagnose Occupational Diseases in individuals, it is necessary to carry out a systematic approach to obtain the necessary information and interpret it appropriately. This approach can be structured into 7 steps from PERDOKI that can be used as guidelines.

Step 1

Determining clinical diagnosis. In this patient anamnesis, physical examination,lab result and histo-pathology result are appropiate with chronic cutaneus lupus eritematosus.

Step 2

Determining the exposure. The patient is a welder who has worked for a construction company for 12 years. Patient work from Monday to Saturday 8 hour/day, with 1 hour break. Physics exposure is in the form of UVB and UVC rays that come from welding rays or from sunlight when patients work outdoors.

Step 3

Determining whether the exposure causes a clinical diagnosis. The relationship between UV light exposure and disease in patients has been searched and critically examined using the Bradford hill criteria:

- Strength: it was found that there was a relationship between UV light exposure and cutaneous lupus.[6-9] Nyberg et al reported significant differences in ICAM-1, VCAM-1, E-selectin between the control group and the cutaneous lupus group ($p < 0.001$).[6] Reefman et al reporting evidence that apoptotic cells/ sun burn cells formed as a result of UV light exposure increased inflammation in cutaneous lupus patients.[8]
- Consistency: The results stated in the four journals even though they were carried out at different times and places, all consistently state that exposure to UV light is associated with an increased risk of recurrence of cutaneous lupus.
- Specificity: CLE is not fully specific triggered by exposure to UV rays at work but exposure to UV rays from sun exposure can also cause recurrence of cutaneous lupus and exacerbate symptoms.
- Temporality: All studies used in this review demonstrated that exposure preceded event.
- Dose response: Reefman et al state that exposure to UVB rays is correlated with the appearance of sun burn cells which are the forerunners of inflammation in cutaneous lupus with a value of $r=0.96$ and $p <0.0001$.[8]
- Biological plausibility:
- exposure to UV light triggers the emergence of apoptotic cells / sun burn cells. In normal people, sun burn cells are immediately removed by macrophages. In patients with Cutaneous Lupus, the clearance of sun burn cells is disrupted, which in turn causes a buildup of cell apoptosis. Where the apoptosis of these cells as keratinocyte cells that have died carry pro-inflammatory mediators which will cause an inflammatory/autoimmune cascade.
- Coherence: Based on some available evidence from various sources stating the same thing about the relationship between UV light and the risk of recurrence of cutaneous lupus
- Experiment: all journal support evidence are experimental studies
- Analogies –

Step 4

Determining dose exposure. In this patient there is exposure to UV radiation from the welding beam of the welder. The patient has worked as a welder for 12 years with 48 hours/week. ACGIH recommends a UV exposure dose of 1.0 J/CM for an exposure period of less than 1000 seconds. In this worker there is no data on how many doses of UV light exposure experienced. A study by Nakashima et al [10] reported that at a distance of 500mm the dose of UV light exposed to workers was 0.51-12.9 mW/cm2. With the magnitude of the dose, the maximum exposure time with this dose is 2.3-5.9 seconds per day. It can be estimated that the worker exposure dose exceeds the ACGIH TLV dose. When compared with PERMENAKER No. 5 of 2018, the TLV dose for 8 hours of exposure is around 0.0001. With the magnitude of the dose affected, workers are expected to exceed the PERMENAKER recommendations.

Step 5

Determining whether there are other factors in the individual that may influence the clinical diagnosis. Various risk factors for cutaneous lupus have been established including infectious diseases, drugs (isoniazid, hydralazine, TNF alpha inhibitors, minoxycycline, exposure to pesticides and heavy metals). While in this patient there were no risk factors. The patient also had no history of using hair dye, hair oil, powder or other cosmetic tools.

Step 6

UV rays from the sun can also affect the course of the patient's illness. Patients rarely have activities/hobbies outside the home, usually leaving the house for about 30 minutes. Regarding the patient's work, he admits his welding work both indoors and outdoors.

Step 7

Establishing occupational diagnosis. Based on steps above, this patient is declared as work aggravated disease.

Cutaneous Lupus Erythematosus (LE) is a diverse group of autoimmune connective tissue disorders localised to the skin that can be associated with systemic lupus erythematosus (SLE). Cutaneous lupus erythematosus (cutaneous LE) includes three categories of LE-specific skin diseases: acute cutaneous lupus erythematosus (ACLE), subacute cutaneous lupus erythematosus (SCLE), and chronic cutaneous lupus erythematosus (CCLE).[11]

Welding is an important tool for maintenance and construction in industry. Arc welding is a process whereby metal is fused together by heat produced from an electric arc. It is widely used in maintenance and repair applications to mild and stainless steel, aluminum, and non-ferrous metals.[12] The electric arc that forms between the electrode and the base metal emits radiation in the full UV spectrum including UVA (400-315 nm), UVB (315-290 nm), and UVC (290-100 nm) wavelengths. Welders, therefore, have an increased risk for broad spectrum, intense exposure to UVR, which may play a notable role in UV-related skin disease without proper protection. The duration of exposure, electrical current used, angle of exposure, amount of ventilation, and the distance from the welding arc play a role in overall UVR exposure.[12,13] Maximum permissible exposure (MPE) limits to UVR have been set by the International Commission on Non-Ionizing Radiation Protection and the National Institute for Occupational Safety and Health.[14] Welders are exposed to total-body UVR doses up to 3000 times the MPE, and mean cumulative exposure calculated over an 8-hour workday.[12,15]

Recommendation Controlling Exposure to UV Radiation When Welding

To eliminate or reduce the risk of exposure to uv radiation, there are hierarcy of control :[13,16]

Elimination

- Use alternative method for joining metal such as mechanical joining (Bolts, rivets)

Substitution

- Use an alternative welding method instead of an electric arc welding process, such as:
  a. oxyacetylene
  b. laser
  c. electron-beam welding
- Reduce the welding electrical current.
- Use metals that emit less radiation, such as stainless steel or iron.

Engineering

- Install fixed (or portable) non-flammable welding curtains or screens to prevent exposure to passers-by.
- Install movable LEV unit with swing arm hoods rely on workers correctly placing hoods and moving the hood as they work
- Use automated robotic welding

Administrative control

- Paint reflective surfaces in dark colours, such as black, to reduce UV reflection.
- Use signs to indicate when welding is in progress to caution people nearby.
- Provide information, instruction and training to all employees on the health risks of exposure to UV radiation from the electric welding arc and how this can be controlled.

PPE

In addition to UVR protection, PPE needs to protect welders from other risks including trauma from welding debris (slag), fires, electrical burns, and fumes. Examples of effective PPE include:

- Powered Air Purifying Respirator (PAPR), which has auto-darkening lens features with extra darkening where high electrical currents are used during the welding process. The powered air provides the wearer with a continuous air flow. Protection is also provided to the ears, head and neck.
- A welding helmet with an auto darkening lens can be worn when welding is not the predominant workplace activity.
- Protective clothing should be provided by an employer and be suitable for the welding process. This may include fire retardant clothing, welder's jackets and pants. Neck protection and welding gloves are also recommended to protect areas of the skin not protected by other clothing.
- Using sunscreen in exposed area like in the face, neck and hand is also important and repeat it after several hours but sunscreen cannot cover UVC that is also emitted in ark welding.[5]

Conclusion

- Cutaneous Lupus Erythematosus (LE) is a diverse group of autoimmune connective tissue disorders localised to the skin that can be associated with systemic lupus erythematosus (SLE). UV light is a major environmental triggering or precipitating factor in cutaneous lupus erythematosus (LE).
- Welder worker are at risk of exposure to uv light which has potential to trigger/aggravate the symptoms of cutaneus lupus
- The diagnosis of occupational in this patient is established based on seven steps of occupational diagnosis, presence of exposure, adequacy of exposure and absence of individual and external factors.
- Arc welding can be a major source of UV radiation exposure. Welders and employers should be advised to work with proper ventilation and with welding masks, clothing, and gloves that not only are fire retardant but also are UV resistant.

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