

Rheumatoid arthritis and its impact on ulceration and healing

KEY WORDS

- » Complications
- » Delayed healing
- » Lower limb ulceration
- » Rheumatoid arthritis
- » Tissue viability

Rheumatoid arthritis is a systemic condition that is thought to have genetic and environmental components and is more common in females and older people. It causes inflammation of the joints and erosion of the bone. Patients can experience associated problems including vasculitis, ulceration, delayed wound healing, foot deformity, neuropathy, limitations in activities of daily living and impaired quality of life. Treatment with medication can increase patients' functional status but may result in delayed wound healing (disease-modifying anti-rheumatic drugs), an increased risk of skin tears (corticosteroids) or infection (biological therapies). A multidisciplinary approach is needed to educate, screen and manage patients. There is currently no optimal approach to managing patients with rheumatoid arthritis and ulcers, so prevention is key.

Rheumatoid arthritis (RA) is a systemic autoimmune condition that has episodes of activity along with periods of remission during which signs and symptoms of the disease are absent. Approximately 1% of the UK population has RA, which equates to over 400,000 people (National Rheumatoid Arthritis Society [NRAS], 2014). RA is thought to have a genetic component and is also influenced by environmental factors, such as viruses or smoking (NRAS, 2014). The systemic effects of the disease can involve the heart, lungs and eyes (National Institute for Health and Care Excellence [NICE], 2018). The prevalence of RA rises with age, although it can occur in a younger population; it is referred to as early-onset RA if it starts from age 14 years (NRAS, 2014). The condition is more prevalent in women (NICE, 2018).

RA has historically been linked to the occurrence of wounds and a delay in wound healing. Garner et al (1973) completed a retrospective study investigating the healing potential of 100 patients with RA who were taking corticosteroids for the disease compared to a population without RA or any inflammatory joint disease. They found a significant increase in time to healing in the RA group ($P < 0.02$). Lower-extremity ulcers are a recognised complication of RA (Shanmugmam et al, 2011). Shanmugmam and colleagues (2011) followed patients with RA and lower extremity

ulcers for 3 years. In this group, just over 30% of ulcers healed within 2 years, even when in clinical remission. The prevalence of foot ulceration in UK patients with RA has been reported as 3.9% (Firth et al, 2008). In the US, the prevalence is higher than this, reaching 4.37% when all the lower leg ulcers are included (Shanmugmam et al, 2011). A relatively recent study including a small cohort of RA patients with foot ulcers ($n=32$) found mean time to healing to be 41 days (Siddle et al, 2012).

PATHOPHYSIOLOGY

Tissue viability problems in RA are due to the disease process itself and its consequential effects on activities of daily living. Tissue viability complications are influenced by the severity of the disease and the medication prescribed to control/suppress the disease process (Firth, 2005). The disease itself is a result of increased T-cell activity and pro-inflammatory cytokine production, which if untreated can lead to irreversible joint destruction (Firth, 2011a).

In RA there is symmetrical inflammatory arthritis, which most commonly affects the smaller joints of the hands and feet. However, it is not limited to the hands and feet. More substantial joints, such as those in the wrists and knees, can also be implicated in the disease process (Firth and Siddle, 2009). The inflammation attacks the



Figure 1. Venous leg ulcer in a patient with RA

synovial membrane that lines the joint, resulting in erosion of the bone (Firth et al, 2008).

Inflammation is not restricted to the joints. Sjören's Syndrome involves inflammation of the temporomandibular joints in patients with RA which leads to reduced lubrication in the mouth and consequently a problem with chewing food (Firth, 2005). It can also affect the circulatory system, resulting in vasculitis. Cutaneous rheumatoid vasculitis usually affects the small and medium-sized vessels that supply the skin and other organs. It can result in the development of cutaneous ulcers. Trauma due to foot deformity is another cause of ulceration in individuals with RA (Shanmugmam et al, 2011).

Although venous leg ulceration is commonly found in individuals with RA, patients may present with leg ulcers of various aetiologies. Following investigation and histological sampling in 20 individuals with RA and leg ulceration, 10 ulcers were found to be multifactorial, 15 were due to venous insufficiency, 11 were vasculitic in origin and four were caused by peripheral arterial disease (Oien et al, 2001).

Neuropathy is a complication of RA in which there is local nerve damage, often due to joint deformity (Firth, 2005). It usually affects both sides of the body and presents with a wide range of symptoms including pain, numbness, a tingling or pricking sensation and muscle weakness (Kaeley et al, 2019).

Activities of daily living are affected by RA because damage to the joints, subsequent loss

of mobility and manual dexterity, result in the individual being less able to perform self-care (Firth, 2005).

CLINICAL PRESENTATION

Inflammation of the synovial membrane within the joints results in joint swelling and pain. This is often evident in the early-morning stiffness seen in individuals with RA.

Vasculitic ulceration is usually preceded by bleeding from underlying tissues, which appears as palpable purpura on the skin. Subsequent ulceration is predominantly found on the lower limbs and dorsum of the foot (Firth, 2005). Ulceration can develop quickly and is exquisitely painful: individuals are able to recognise the wound pain as a separate entity to their generalised arthritic pain (Firth et al, 2011). The ulcer margins are clearly demarcated, as is found in arterial ulceration.

Rheumatoid nodules are commonly found over bony prominences, such as the inner and outer malleolus. These nodules put the overlying skin under increased pressure. They may proceed to ulceration or regress spontaneously (Firth, 2005).

Changes in the anatomy of the foot, see *Figure 2*, can lead to deformities including hammer and claw toes, hallux vagus, prominent metatarsal heads and an increase in plantar pressure, which can result in the development of callus.

Venous hypertension may occur due to fixed ankle joints, which prevent mobility and reduce the patient's ability to activate the calf muscle pump — essential for returning blood from the lower limbs to the heart, see *Figure 1*. The importance of the foot pump in venous return was recognised by Negus (2009), who referred to the calf muscle pump as the "peripheral heart".

PSYCHOLOGICAL EFFECTS

As with many chronic illnesses, RA can have a significant impact on a person's mental health, with reports of anxiety and depression being prevalent in individuals with RA (Firth, 2005). This can be a direct result of pain and fatigue and the limitations RA imposes on activities of daily living. A qualitative study investigating the impact of foot ulceration on health-related quality of life in individuals with RA found ulceration to

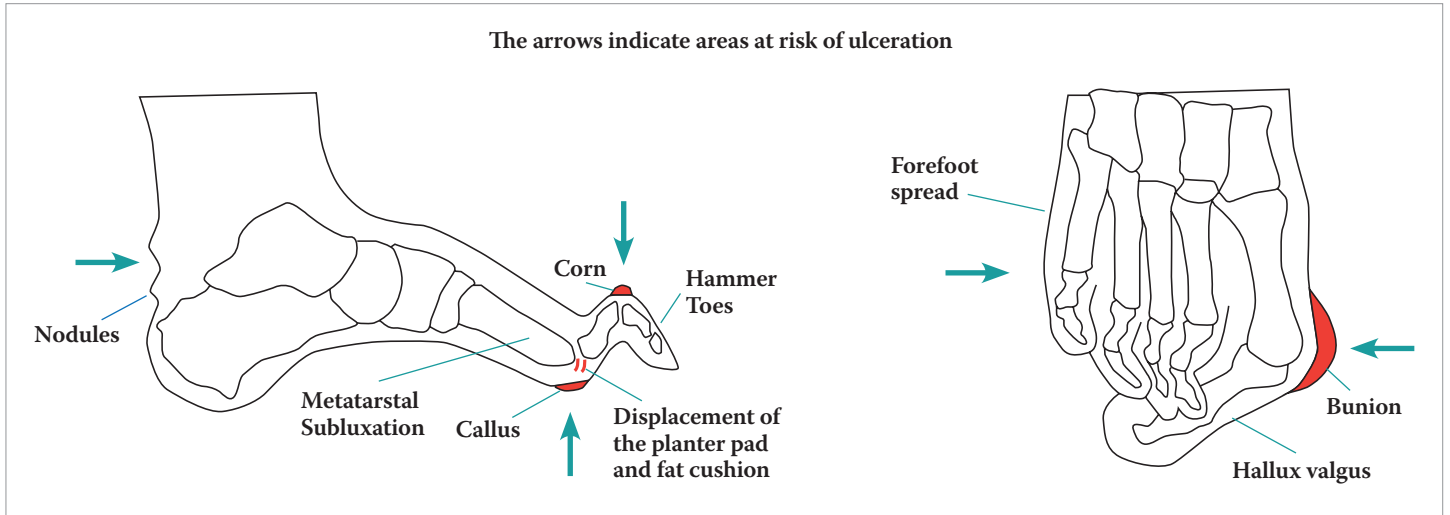


Figure 2. Various forms of foot deformity that may occur in patients with rheumatoid arthritis (adapted from Firth, 2005)

have an addition impact on physical, social and psychological domains, highlighting feelings of hopelessness (Firth et al, 2011).

TREATMENT

A number of medications are used to treat RA. These have various benefits but may result in drawbacks with regards to wound healing. Disease-modifying anti-rheumatic drugs (DMARDs) act on the immune system and slow or stop the radiological progression of RA (NICE, 2018). DMARDs have revolutionised the management of RA and improved the functional status of patients (Ito et al, 2015). A retrospective review found that DMARDs did not increase the risk of surgical site infection but did delay wound healing in RA patients undergoing elective orthopaedic procedures (Tada et al, 2016).

Corticosteroids are often used to treat RA. They may not be appropriate for patients at high risk of ulceration as they have an adverse impact on the inflammatory and proliferative stages of wound healing as well as wound contracture. In addition to this, individuals on long-term steroid therapy develop paper-thin skin that is susceptible to tears and breaks easily when traumatised (Firth, 2005).

Biological therapies — mainly tumour necrosis factor inhibitors such as infliximab and adalimumab — work by targeting pro-inflammatory cytokines. They have an adverse effect on the immune system, however, placing individuals at a greater risk of developing local, generalised and surgical site

infection and delayed wound healing (Firth and Critchley, 2011; Fitzgerald et al, 2015; Ito et al, 2015).

Methotrexate targets both pro- and anti-inflammatory cytokines. It is often given in combination with biological therapies. Close monitoring is required because liver toxicity can develop in some individuals taking methotrexate (Firth et al, 2008; 2011a).

Drug-induced gastric bleeding in patients with RA can cause anaemia, which will delay the healing process (Firth, 2005).

The prevention and management of ulceration in RA requires a multidisciplinary approach (Firth, 2011b). Preventive medical management includes the monitoring of systemic medication and, when appropriate, screening for vasculitis in other organs of the body and for sepsis. The physiotherapist will be able to help with exercise programmes to improve mobility and functional activity, while the occupational therapist can educate the individual on joint protection (Firth, 2011b). The podiatrist can provide foot screening to monitor for foot deformities and debride callosities if present. Ankle brachial pressure index screening can be problematic and too painful for individuals with RA to tolerate. In this situation, toe brachial pressure readings should be undertaken (Siddle et al, 2012). The podiatrist or orthotist can provide footwear and off-loading equipment to accommodate foot abnormalities if present (Firth, 2005). The nurse can advise patients on how to maintain skin integrity by using emollient therapy. They can also explain how to implement the

International Skin Tear Advisory Panel best practice recommendations for preventing and managing skin tears to patients receiving long-term systemic steroid therapy for RA (Carville, 2014; LeBlanc et al, 2018).

If ulcers require the application of a dressing, the fragility of the patient's skin needs to be considered. Skin-friendly adhesives should be used and, if necessary, adhesive remover is used to prevent skin trauma on dressing removal. The presence of local infection may be a complication and should be highlighted as a potential problem in the individual's plan of care. Negative pressure wound therapy (NPWT) can be used for local wound management. Morimoto et al (2016) developed a NPWT grip tape technique to aid artificial dermis conformability to a circumferential venous leg ulcer in a patient with RA. NPWT has been used successfully with a silver hydrofibre dressing to treat an infected leg ulcer in a RA patient (Bazanlinski et al, 2018).

Patient education is an important part of treatment, especially relating to ulceration and the its prevention (Firth et al, 2012). NICE quality standards recommend that patients with a new presentation of RA be offered educational and self-management activities within 1 month of diagnosis (Ledingham et al, 2017).

CONCLUSION

RA is a systemic autoimmune disease and skin ulceration, mainly of the lower leg and foot, is a recognised complication of the condition. Ulceration can be multifactorial and caused by various means, such as trauma, venous insufficiency, pressure and vasculitis. Individuals have to cope with living with this chronic long-term disease, the need for surgical interventions to treat joint erosion and restrictions on their everyday activities. Consequently, RA and the ulceration that can result from it have a detrimental impact on the individual's quality of life. Although DMARDs have improved the functional ability of many individuals, they can have a negative impact on the healing process and place the individual at risk of recurrent wound infections (Ito et al, 2015).

Management of the individual with RA and ulceration is multifactorial and involves a multitude of healthcare professionals involved in screening, prevention and management. Local wound management depends on the clinical challenges posed by the ulcer and surrounding skin. There are reports of NPWT being used to treat these individuals. RA and ulceration are a complex set of circumstances that are clinically very challenging. As yet there are no optimal solutions. **WUK**

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