Journal of Arthritis
ISSN: 2167-7921

Perkins et al., J Arthritis 2017, 6:3
DOI: 10.4172/2167-7921.1000e115

Editorial Open Access

Steroids and Osteoarthritis

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Received date: May 22, 2017; **Accepted date**: May 24, 2017; **Published date**: June 07, 2017

Editorial

Corticosteroids are used in the treatment of arthritis. Despite the differences in the aetiology of rheumatoid and osteoarthritis; joint pain, stiffness, swelling and deformity remain features of both conditions. These factors contribute to the disability of both conditions and impact patients' quality of life [1]. Current management is focused on reducing joint pain and inflammation, whilst improving or maintaining joint function [2] Although not recommended as the first line treatment in rheumatoid or osteoarthritis, steroids have been used selectively in the management of these symptoms. Corticosteroids are used in combination with other treatments and in various preparations. Other injectable substances are available and is explained by Golding et al in this issue. For the purpose of this editorial we will focus on the use of injected corticosteroids.

There is no standardised preparation of corticosteroid injection; make up varies locally based on a combination of clinical experience and personal preference. The different mechanisms of action can guide selection in particular clinical situations and properties are modified to optimise anti-inflammatory action [3]. Different drug delivery systems are used to increase drug residence including thermo-gelling, pH-sensitive gels and bio-adhesive materials [4]. Methylprednisolone is commonly used universally with triamcinolone hexacetonide being effective when injected into large joints and hydrocortisone into small joints [3,5].

In theory, during acute inflammation, glucocorticoids work by decreasing vascular permeability and inhibiting the migration and accumulation of polymorphonuclear lymphocytes into tissues. Apoptosis in lymphoid cells is induced, inhibiting expansion of T and B lymphocytes and reducing circulating eosinophils, basophils and monocytes. Glucocorticoids also inhibit the migration of neutrophils and inhibit the activity of fibroblasts, reducing fibrosis and scar formation. The systemic action of steroids is proven and they are consequently beneficial in managing rheumatoid arthritis. This systemic action is applied locally to intra-articular injections in osteoarthritis despite the differences in pathology to rheumatoid arthritis. The most notable contrast between the two is that rheumatoid arthritis is characterised by synovial inflammation and erosion of cartilage and bone, whereas osteoarthritis is believed to be caused by mechanical forces. Osteoarthritis exhibits the growth of osteophytes and little evidence of the typical form of inflammation only what is limited to the cartilage and bone [6].

Despite avoiding the well-known side effects of oral steroids, injected corticosteroids are not without their own potential side effects. These include pain and swelling at the site of the injection lasting a couple days and an increased risk of infection, blushing, thinning or lightening of the skin. Rare cases of sudden loss of visual acuity have been reported following injections [7]. Attention is required when prescribing injected steroids to patients with diabetes as a temporary increase in blood sugar occurs following intramuscular injections, though this is minimal after intra-articular injections [8]. Common problems are the presence of comorbidities in which patients are taking anticoagulants. Due to the risk of bleeding into a joint these patients may need their INR monitored before an intraarticular injection [8].

Intra-articular injection of corticosteroids has been a part of the treatment of osteoarthritis for over 50 years despite limited evidence of its efficacy [9]. The recommendation (NICE guideline 117 section 1.5.12) for their use, in addition to core treatment, is based on evidence that they may be effective in providing short term relief of pain and improvement in function [10]. It is not, by any means, the first choice in managing the condition, but if physical therapies such as strength and fitness exercises and pharmacological methods are ineffective or not tolerated well, it can be an effective short-term option when used as a one off. However, the most current reviews on the use of corticosteroids in osteoarthritis still stress the need for further experimental research in order to confirm or refute the true effects of the injections, both in the short and the long term [9,10].

The traditional approach of focusing on the treatment of late stage osteoarthritis has not yielded effective disease modifying treatments, consequently clinical care focuses on palliation until joint replacement is indicated [11]. Both total hip and knee arthroplasty are cost effective procedures, with total hip replacement being slightly superior in terms of value per QALY [12]. Joint replacement is major surgery not without its complications and a growing concern is that younger patients will have an increased requirement for revision surgery [13].

Corticosteroid injections are used as a standard treatment to 'buy time' before joint surgery and is widely accepted due to no other alternative treatments. When considering the efficacy of corticosteroids in the short term, for example 3 months after injection, they are reported effective at reducing both patient reported outcomes of pain and objective measures. However, when looking long term, the benefit of an intraarticular corticosteroid injection is poor and is considered a quick fix [6,14-17]. Worryingly, recent studies have found that the dose of corticosteroid injected in osteoarthritis can actually cause chondrocyte death which could actually be exacerbating the loss of chondrocyte extra-cellular matrix, destructive loss of the dynamic cartilage system and the basis of osteoarthritis [18-20]. Moreover, corticosteroids have been undoubtedly injected with local anaesthetics without consideration to their influence on this dynamic environment within the joint capsule. Put simply, local anaesthetic has been injected to reduce the pain patients are experiencing without addressing the cause or processes of osteoarthritis which led to the pain initially. The local anaesthetic has a short term benefit to the patient without any disease modifying effects. There is an increasing bank of evidence

demonstrating local anaesthetics to be detrimental to chondrocyte viability and proliferation, consequently accelerating the processes believed central to the aetiology of osteoarthritis itself [21-25].

Additionally, in the view of pharmaceutical companies, combining corticosteroids and local anaesthetic is considered mixing your own drug. Therefore, interactions between the two agents were not considered or tested before intraarticular injections became common practice. Evidence now indicates a synergistic effect of corticosteroid and local anaesthetic on chondrocyte viability and proliferation, on top of the negative effects already imposed from these individual treatments [26]. For such a huge public health issue, osteoarthritis being the world's third biggest cause of disability, it would seem arrogant to dismiss other forms of treatment on the basis of tradition and these avenues must be explored. Would it not make more sense to inject something native into joints to facilitate joint homeostasis? With the aim to cure or at least stabilise the severity of osteoarthritis rather than compromise the cartilage, clinically promising results have been observed after injecting hyaluronic acid and platelet-rich plasma alone [14,27-29]. What is the science behind a maximum three intra-articular injections? Is it because after three injections there are no chondrocytes left to gain any benefit.

An element of the conservative management of osteoarthritis is physiotherapy [30]. The aim of which is to reduce joint stiffness, maintain range of movement and increase the strength of muscles surrounding affected joints. The possibility that the aspect of strength is impaired by a one-off steroid treatment needs consideration. It is not known whether the effects on muscle mass from a single intra-articular corticosteroid injection are similar to those previously demonstrated of intramuscular injections. However, given the known association between BMI and osteoarthritis, it may be relevant to investigate whether this treatment could be contributing to an altered body composition in these patients, consequently impairing strength gains.

In summary, there is not enough evidence for the use of steroids in osteoarthritis, we assume they are anti-inflammatory and apply systemic knowledge to local joints. Rheumatoid and osteoarthritis are very different, steroids may provide temporary pain relief but have very toxic local effects to injured cartilage and joints in osteoarthritis. Whilst in rheumatoid arthritis steroids reduce synovial inflammation, in osteoarthritis the synovium is the only source of food supply to the chondrocytes, so killing it doesn't make any logical sense. The benefits and indications for treatment with oral, intramuscular, intravenous and intra-articular steroids should not be confused or used interchangeably without a stronger evidence base. Neither should random combinations of steroid and local anaesthetic be mixed by doctors, changing the pharmacodynamics of the drug till it is no longer known what is really being injected. We need a call for the 'steroid' label of a quick fix to stop and maybe we would be better off using a more consistent treatment which doesn't require random mixing such as injecting native joint elements like hyaluronic acid.

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