

Patient information from the BMJ Group

Tennis elbow

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Tennis elbow

Tennis elbow can be painful and can stop you from using your arm normally. But there's a good chance your elbow will get better by itself with time. There are treatments that can help with the symptoms.

We've brought together the best research about tennis elbow and weighed up the evidence about how to treat it. You can use our information to talk to your doctor and decide which treatments are best for you.

What is tennis elbow?

Tennis elbow is a pain or soreness on the outside of your elbow.



You can get tennis elbow if you keep using your elbow in a way that strains the tendons.

It happens when you damage the tendons in your lower arm. These tendons attach your muscles to the bone of your elbow. When you move your wrist or hand, the tendons keep the muscles in place.

Tennis elbow often starts for no clear reason. Most people who get tennis elbow have not had a specific injury to their arm or elbow. But many people with tennis elbow often do work or a sporting activity where they move their arm in a repetitive way.^[1] This creates tiny tears in the tendon that then become **inflamed**.

Although playing tennis and other racquet sports such as badminton or squash can lead to tennis elbow, only 1 in 20 people get it this way.^[2] Many other things, such as raking leaves, wringing clothes, or using scissors can cause tennis elbow.^[3] Some jobs are associated with a higher risk of tennis elbow. These include meat cutting, plumbing, and

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painting. Research also shows a higher risk of tennis elbow among people whose jobs involve: ^[4]

- Using a tool that weighs more than 1 kilogram (2.2 pounds)
- Lifting loads that weigh more than 20 kilograms (44 pounds) at least 10 times a day
- Doing a repetitive movement for more than two hours a day.

Tennis elbow mostly affects people between ages 30 and 50. ^[1] But it can happen to anyone.

You usually get tennis elbow in the arm you use most (for example, in the right arm if you are right-handed). You're more likely to get tennis elbow if your forearm muscles aren't fit and you over-exert them.

Doctors sometimes call tennis elbow **lateral epicondylitis**.

What are the symptoms of tennis elbow?

If you have tennis elbow, your elbow will be tender and painful, especially when you grasp something or twist your arm. The symptoms usually get gradually worse.

Pain is the main symptom of tennis elbow. ^[5] The outside of your elbow becomes sore and tender. You may also feel pain in the muscles in your lower arm and the back of your hand. The pain and stiffness may spread to other parts of your arm, shoulder, or neck. And you may notice your grasp is weak. ^[5]

Your pain may go away after a day or so, but it's likely to come back if you keep doing the activity that triggered your tennis elbow.

If you have a fever or your elbow is red and swollen you should see your doctor straight away.

How common is tennis elbow?

Tennis elbow is common.

Between 1 and 3 people in 100 people have it at any given time. ^[6] About 5 in 1,000 people in the UK go to see their doctor each year because of tennis elbow. ^[7]

What treatments work for tennis elbow?

Tennis elbow usually gets better by itself. But treatment may improve your symptoms more quickly. The sooner you give your elbow a chance to heal, the more likely your arm is to return to full strength.

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- Only use your arm as much as the pain allows and avoid repeated twisting movements.
- You can try treating your elbow pain at home by applying an ice pack, gently rubbing your elbow with an anti-inflammatory painkilling gel, such as Ibuleve, or taking a painkilling tablet, such as ibuprofen.
- You should see your doctor if your elbow isn't any better after a few weeks. But if you have a fever or your elbow is red and swollen you should see your doctor straight away.
- Steroid injections in your elbow will probably relieve the pain for a short while. But you may have more problems in the long run. You may want to wait and see if your elbow gets better by itself without treatment.
- Having treatment with a low-level **laser** directed at your tendon may improve your pain in the short term.
- There are several other treatments for tennis elbow, including acupuncture, exercises, arm braces, ultrasound, manipulation, and surgery. However, we need more research to know whether they can help.

Which treatments work best? We've looked at the research and given a rating for each treatment according to how well it works.

Treatment Group 1

Treatments for tennis elbow

Treatments that are likely to work

- [NSAID gels, mousses, and sprays](#)
- [NSAID tablets](#)
- [Steroid injections](#)
- [Low-level laser therapy](#)

Treatments that need further study

- [Acupuncture](#)
- [Arm braces](#)
- [Combining physical therapies](#)

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- [Exercise](#)
- [Injections of your own blood](#)
- [Iontophoresis](#)
- [Manipulation](#)
- [Pulsed electromagnetic field therapy](#)
- [Surgery](#)
- [Ultrasound](#)

Treatments that are unlikely to work

- [Shockwave therapy](#)

What will happen to me?

There's a good chance that your tennis elbow will get better by itself. It may take several weeks or months. But most people recover within a year.

One large study found that half of all people with tennis elbow were completely better or much improved after four weeks.^[8] After a year, almost 8 in 10 people had recovered or were much improved.^[8]

A small number of people have pain for up to two years.^[9] A few people have tennis elbow for much longer.

Treatments:

NSAID gels, mousses, and sprays

In this section

Nonsteroidal anti-inflammatory drugs (NSAIDs) are a type of painkiller. A summary of the research (a [systematic review](#)), which included three studies, found that gently rubbing an NSAID gel over your elbow can improve your symptoms.^[10] But we don't know how long this benefit lasts. You can buy many brands of NSAID gels, mousses, and sprays from a pharmacist. Brand names include Ibuleve (containing ibuprofen) and Volterol Emulgel (containing diclofenac). If they don't help, your doctor may prescribe a gel with a different painkiller or a higher dose.

Mild side effects (such as itching) are common.^[11] But a cream or gel has fewer side effects than [NSAID tablets](#).

NSAID tablets

In this section

One study has found that taking nonsteroidal anti-inflammatory drug (NSAID) tablets may help with the pain in your elbow for a short time.^[10] But we don't know how long the effects of these drugs last.

We also don't know if taking NSAID tablets works better than using an [NSAID cream or gel](#) . There hasn't been enough research to tell us.

You can buy some NSAIDs, such as low-dose diclofenac and ibuprofen, at a pharmacy. Or your doctor may prescribe you stronger painkillers, such as higher-dose diclofenac (brand names are Diclomax, Motifene, Voltarol), ketoprofen (Orudis, Oruvail), and naproxen (Naprosyn, Arthroxen).

You can get stomach pains and diarrhoea if you take NSAID pills.^[10] And they can cause stomach ulcers.

Taking high doses of some NSAIDs every day for a long time can increase your risk of a heart attack or [stroke](#) . This isn't likely to be a problem if you take NSAIDs for a short time to treat pain. But if you'd like to read more, see [Warnings about the side effects of NSAIDs](#) .

Steroid injections

In this section

Studies have found that steroid injections can reduce pain from tennis elbow over the following few weeks. You'll probably feel less pain and be able to use your arm more at first.^{[20] [21] [22] [23] [24]}

But steroid injections may not help in the long run and they may make you more likely to get tennis elbow in the future. One study found that tennis elbow came back within six weeks in about 7 in 10 people who had injections.^[25]

This study also found that people who had physiotherapy rather than injections did better in the long term.^[25]

Steroid injections usually contain one of these steroids: methylprednisolone, hydrocortisone, or triamcinolone. The steroid is often combined with a [local anaesthetic](#) , so the injection is painless.

There is a small risk that steroid injections will cause your face to be flushed, some pain where you had the injection, or other skin problems.

Acupuncture

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In this section

Some people try acupuncture to relieve their elbow pain. Some research suggests it works to relieve pain for a short time. But the benefit may not last more than a few weeks. [\[26\]](#) [\[27\]](#) [\[28\]](#) [\[29\]](#)

However, we need more research to be sure whether acupuncture works for tennis elbow, especially in the long term.

Exercise

In this section

There are exercises you can do to strengthen your forearm muscles and avoid twisting movements. Some also involve stretching. But we need more and better research to say whether exercises work for tennis elbow. It's best to ask a [physiotherapist](#) for advice on what exercises to do.

Most of the studies on exercise have been small and not very good quality. [\[22\]](#) [\[30\]](#) Some have suggested that exercise can reduce pain and allow you to grip without pain. [\[31\]](#) [\[32\]](#) But others have found that exercise doesn't help much. [\[33\]](#) [\[34\]](#)

One study looked at people with tennis elbow who were shown exercises and who had their elbow [manipulated](#) by a physiotherapist. It found that people who had these treatments felt better and were less likely to take painkillers than people who had no treatment. It also found that physiotherapy worked better in the long term than [steroid injections](#). [\[35\]](#)

Arm braces

In this section

Wearing a brace around your forearm and elbow may help rest your tendon and give it a chance to heal. Braces can be made out of silicone, plastic, or other materials. You can buy them in some pharmacies or sports shops. Or you can ask a physiotherapist or occupational therapist for help in getting a brace.

In the short term, a support sleeve or strapping worn over your elbow might mean you can grip harder without pain. [\[36\]](#) But there hasn't been enough long-term research to say whether an arm brace will help with elbow pain. [\[37\]](#)

Surgery

In this section

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If your tennis elbow is severe, surgery may be an option. There are many types of operations, but most involve removing the damaged tissue and reattaching the normal tissue to the bone.

We don't know how well surgery works for tennis elbow, or what type of surgery might be best. There hasn't been much good research. ^[38]

Shockwave therapy

In this section

Directing strong sound waves at your elbow is unlikely to help with pain or improve the strength of your grip. There have been a lot of studies on shockwave therapy, but these studies have not produced convincing results that shockwave therapy is helpful. ^[39] ^[40] ^[41] Most of them found this treatment didn't help.

Shockwave therapy can be painful and there's a risk of side effects. However, most side effects are fairly mild, such as reddening of the skin, bleeding, and feeling sick.

Low-level laser therapy

In this section

This treatment involves using a focused beam of light (a **laser**) directed at your elbow.

Several studies have looked at using different strengths of lasers, directed at different parts of the arm. ^[42] ^[43] Some have found that applying a low-level laser directly over the tendon area can improve pain. However, the improvements may not last beyond two months.

We don't know if laser treatment can have side effects. The research doesn't tell us enough to be certain.

Ultrasound

In this section

If you have ultrasound treatment, your doctor or physiotherapist will direct high-intensity sound waves at your arm with a special machine, to improve your pain and help your tissue to heal. However, we don't know if this actually helps.

So far, the research doesn't provide strong support for using ultrasound for tennis elbow. Some studies have found that it may improve pain and grip strength, while others have suggested that it doesn't. ^[22] ^[24] ^[44] We don't know if ultrasound can be harmful, as studies haven't reported on this.

Pulsed electromagnetic field therapy

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In pulsed electromagnetic field therapy (PEMFT for short), a device gives out small pulses of electricity to stimulate tissues to heal. But there haven't been enough good-quality studies to know whether it helps with tennis elbow. ^[22] ^[44]

One study compared PEMFT with [steroid injections](#), finding that it didn't help as much with pain or movement soon after treatment. However, three months later, people who'd had PEMFT had less pain at rest, during activity and at night than those who'd had the injections. This was a small study, so we need more research to confirm its findings. ^[45]

We don't know whether PEMFT can be harmful. The studies didn't report on this.

Iontophoresis

In this section

Iontophoresis uses a small electric charge to deliver medicine through the skin. For tennis elbow, studies have looked at using iontophoresis to deliver [steroids](#) and painkillers (such as the [NSAID](#) diclofenac).

So far, there's not enough research to say whether this is helpful, or what medicines might be most effective when delivered through iontophoresis. ^[22] ^[44] ^[46]

One study found that iontophoresis can cause mild skin reactions, such as redness, a burning or itchy feeling, and blisters. ^[47]

Manipulation

In this section

If you have manipulation, a health professional uses their hands to move and massage parts of your body. For tennis elbow, this is often your elbow, wrist, or forearm. The aim is to relieve pain and improve movement.

There hasn't been much good research on manipulation for tennis elbow, so we can't yet be certain that it works. ^[22] ^[24]

We found two studies that looked at manipulating the elbow joint. ^[48] ^[49] When researchers pooled the studies' results, they found that people who had manipulation could grip their hand more strongly without pain than those who had sham manipulation. ^[22]

Another study looked at combining a type of manipulation called Mulligan's mobilisation with movement (MWM) with ultrasound treatment. ^[50] MWM usually involves a health professional gliding their hands on your forearm while you make a fist.

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After three weeks of treatment, the people having MWM plus ultrasound had less pain than those having ultrasound alone. Once treatment was over, those having the combined treatment also had better grip strength and were more likely to report that they generally felt better and were able to do more with their arm.

The studies didn't give any information on side effects, so we don't know if manipulation can be harmful.

Combining physical therapies

In this section

Some people use a combination of physical therapies for their tennis elbow, such as massage with [ultrasound](#) and [exercise](#). However, there's not enough research yet to say whether this helps or what combination of therapies might work best. ^[23] ^[24] ^[44] ^[51] ^[52]

One study suggested that exercise plus massage combined with ultrasound may be more effective than a [brace](#) at improving pain and movement after six weeks. ^[53] However, other research has suggested that people having combined therapies are just as likely to have their symptoms return after six weeks as those who don't have these treatments. ^[25]

The research doesn't say whether combining physical therapies can cause any side effects.

Injections of your own blood

In this section

This is a newer treatment that involves having injections of your own blood into your tendon. You might also have injections made from your blood plasma, which is rich in platelets. (Platelets are small cells in your blood that help with clotting and healing.)

If you have your blood injected, this is called an **autologous whole blood injection**. If you have only plasma injected, this is called a **platelet-rich plasma injection**.

The National Institute for Health and Care Excellence (NICE) is the government organisation that advises doctors about treatments. NICE says that blood injections are safe enough for use in the NHS, but there isn't enough evidence to say if this treatment works. You should talk to your doctor about the risks and benefits of having this treatment. ^[54]

Further informations:

Warnings about side effects of NSAIDs

Nonsteroidal anti-inflammatory drugs (NSAIDs) are used to treat pain and inflammation. Ibuprofen is probably the best-known NSAID. Although they are often useful, they can have side effects, including causing stomach upsets and ulcers, or more rarely, allergies or problems with your kidneys or liver. ^[12]

People who take **high doses** of some NSAIDs **for a long time** may have a slightly higher risk of having a heart attack or a stroke. High doses of NSAIDs may be used over a long period of time to treat conditions such as arthritis.

It's not always clear what counts as a long time for taking NSAIDs. In some research, two-thirds of the heart attacks happened in studies where people took NSAIDs for a year or longer. ^[13]

Below, we look at the different kinds of NSAIDs and what the research that has been done so far shows about their safety.

NSAIDs you can buy over the counter

You can buy low doses of some NSAIDs, such as ibuprofen, at a pharmacy. Taken at this lower dose and for a short time, ibuprofen doesn't seem to increase people's risk of a heart attack or stroke. ^[14]

You can also get larger doses of ibuprofen on prescription from a doctor (see our information on prescription ibuprofen below). Taking these larger doses every day may slightly increase your risk of a heart attack or stroke. But these doses are higher than the amount you'd take for a headache or other kinds of short-term pain.

Diclofenac is another NSAID that you can buy in low doses over the counter. It's sold for treating headaches, other aches and pains, and cold and flu symptoms. Diclofenac does increase the risk of heart attacks and strokes if used regularly. ^[15] However, there's probably much less of a risk if you're taking low doses for short periods of time. ^[16]

You can also buy an NSAID called naproxen without a prescription, for treating period pain. Naproxen doesn't seem to cause much increase in the risk of heart attacks or strokes. ^{[13] [15] [17]}

NSAIDs your doctor may prescribe

Selective COX-2 inhibitors

Selective COX-2 inhibitors are a newer type of NSAID. Some people got stomach problems as a side effect of taking older NSAIDs. COX-2 inhibitors were designed to

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cause less irritation to your stomach. But research has found that these newer drugs can slightly increase your risk of a heart attack or a stroke.

COX-2 inhibitors called valdecoxib (brand name Bextra) and rofecoxib (Vioxx) have been taken off the market because of their side effects.^[14]

Other COX-2 inhibitors are still available in the UK. These include:

- celecoxib (Celebrex)
- etoricoxib (Arcoxia)
- meloxicam (Mobic).

The overall risk of having a heart attack or stroke when taking these drugs is fairly small. For every 1,000 people regularly taking high doses, an extra three people will have a heart attack or stroke.^[13] Your doctor can help you weigh up the risks and benefits these drugs will have for you.

Also, you should not take etoricoxib if you have high blood pressure.^[18] But you can take it once your blood pressure is under control.

Other NSAIDs

There are several NSAIDs that aren't COX-2 inhibitors, which may also be prescribed by your doctor. They include (with brand names):

- diclofenac (Diclomax, Motifene, Voltarol)
- etodolac (Eccoxolac, Etopan, Lodine)
- ibuprofen (Brufen, Nurofen, Cuprofen)
- ketoprofen (Oruvail, Orudis)
- meloxicam (Mobic)
- naproxen (Naprosyn, Arthrofen).

Some of these NSAIDs may cause a small increase in your risk of a heart attack or stroke. Research has found that regularly taking high doses of ibuprofen or diclofenac over a long period of time may increase your risk of these problems.^[14]

We don't know exactly how big the risk is, or how it varies between the different drugs. The research that has been done so far suggests that:

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- Taking diclofenac has a similar risk of heart attack to some COX-2 inhibitors.^[14] That would mean three extra heart attacks or strokes for every 1,000 people taking high doses every day
- Naproxen may be safer than COX-2 inhibitors.^[14] Most studies so far seem to show that naproxen doesn't increase people's chances of getting a heart attack or a stroke.^{[13] [15] [17]}

Guidelines for doctors say that for most people, the benefits of these drugs outweigh the risks.^[19] The risks are probably lower for people who only take NSAIDs for a short time or take smaller doses.^[14]

Guidelines for doctors

Doctors have guidelines about how they should prescribe COX-2 inhibitors and other NSAIDs. They say that:^[14]

- People should take the lowest dose of an NSAID that works for them
- People should only take NSAIDs for as long as they need to. People taking them for a long time should have their treatment reviewed regularly
- People who already have heart disease shouldn't take COX-2 inhibitors
- Doctors should weigh up the risks and benefits of NSAIDs for each person. For example, your doctor may suggest a COX-2 inhibitor if you're at risk of stomach problems, but not of a heart attack
- People are more likely to get stomach problems if they take aspirin as well as an NSAID. People should only take aspirin and an NSAID together if they really need to.

If you're worried about the medicine you're taking, talk to your doctor.

Glossary:

inflammation

Inflammation is when your skin or some other part of your body becomes red, swollen, hot, and sore. Inflammation happens because your body is trying to protect you from germs, from something that's in your body and could harm you (like a splinter) or from things that cause allergies (these things are called allergens). Inflammation is one of the ways in which your body heals an infection or an injury.

laser

A laser focuses light in a way that makes it able to cut through things. Surgeons sometimes use lasers when they need to do delicate operations.

systematic reviews

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A systematic review is a thorough look through published research on a particular topic. Only studies that have been carried out to a high standard are included. A systematic review may or may not include a meta-analysis, which is when the results from individual studies are put together.

stroke

You have a stroke when the blood supply to a part of your brain is cut off. This damages your brain and can cause symptoms like weakness or numbness on one side of your body. You may also find it hard to speak if you've had a stroke.

heart attack

Doctors call a heart attack an acute myocardial infarction (or acute MI). This is the name for the damage that occurs to the heart muscle if it isn't getting enough blood and oxygen because a branch of the coronary arteries is blocked. During a heart attack, you may have pain or heaviness over your chest, and pain, numbness or tingling in your jaw and left arm.

arthritis

Arthritis is when your joints become inflamed, making them stiff and painful. There are different kinds of arthritis. Osteoarthritis is the most common type. It happens when the cartilage at the end of your bones becomes damaged and then starts to grow abnormally. Rheumatoid arthritis happens because your immune system attacks the lining of your joints.

local anaesthetic

A local anaesthetic is a painkiller that's used to numb one part of your body. You usually get local anaesthetics as injections.

physiotherapist

A physiotherapist is a health professional who is trained to use physical activity and exercises to help people's bodies heal.

Sources for the information on this leaflet:

1. American Academy of Orthopaedic Surgeons. Tennis elbow (lateral epicondylitis). September 2009. Available at <http://orthoinfo.aaos.org/topic.cfm?topic=A00068> (accessed on 20 November 2013).
2. Murtagh J. Tennis elbow. *Australian Family Physician*. 1988; 17: 90-91, 94-95.
3. Jobe FW, Ciccotti MG. Lateral and medial epicondylitis of the elbow. *Journal of the American Academy of Orthopaedic Surgeons*. 1994; 2: 1-8.
4. van Rijn RM, Huisstede BM, Koes BW, et al. Associations between work-related factors and specific disorders at the elbow: a systematic literature review. *Rheumatology*. 2009; 48: 528-536.
5. US National Library of Medicine. Medline Plus medical encyclopedia: tennis elbow. Available at <http://www.mayoclinic.com/print/tennis-elbow/DS00469/DSECTION=all&METHOD=print> (accessed on 20 November 2013).
6. Allander E. Prevalence, incidence and remission rates of some common rheumatic diseases and syndromes. *Scandinavian Journal of Rheumatology*. 1974; 3: 145-153.
7. Verhaar J. Tennis elbow: anatomical, epidemiological and therapeutic aspects. *International Orthopaedics*. 1994; 18: 263-267.
8. Smidt N, van der Windt DAWM, Assendelft WJJ, et al. Corticosteroid injections for lateral epicondylitis are superior to physiotherapy and a wait and see policy at short-term follow-up, but inferior at long-term follow-up: results from a randomised controlled trial. *Lancet*. 2002; 359: 657-662.
9. Hudak P, Cole D, Haines T. Understanding prognosis to improve rehabilitation: the example of lateral elbow pain. *Archives of Physical Rehabilitation*. 1996; 77: 568-593.
10. Green S, Buchbinder R, Barnsley L, et al. Non-steroidal anti-inflammatory drugs (NSAIDs) for treating lateral elbow pain in adults (Cochrane review). In: *The Cochrane Library*. Wiley, Chichester, UK.
11. Percy E, Carson J. The use of DMSO in tennis elbow and rotator cuff tendonitis: a double blind study. *Medicine and Science in Sports and Exercise*. 1981; 13: 215-219.
12. British National Formulary. Non-steroidal anti-inflammatory drugs. Section 10.1.1. British Medical Association and Royal Pharmaceutical Society of Great Britain. Also available at <http://bnf.org> (accessed on 20 November 2013).
13. Kearney PM, Baigent C, Godwin J, et al. Do selective cyclo-oxygenase-2 inhibitors and traditional non-steroidal anti-inflammatory drugs increase the risk of atherothrombosis? *BMJ*. 2006; 332: 1302-1308.

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14. Medicines and Healthcare products Regulatory Agency. Cardiovascular safety of COX-2 inhibitors and non-selective NSAIDs. July 2010. Available at <http://www.mhra.gov.uk/Safetyinformation/Generalsafetyinformationandadvice/Product-specificinformationandadvice/index.htm> (accessed on 20 November 2013).
15. McGettigan P, Henry D. Cardiovascular risk and inhibition of cyclooxygenase: a systematic review of the observational studies of selective and nonselective inhibitors of cyclooxygenase 2. *Journal of the American Medical Association*. 2006; 296:1633-1644.
16. electronic Medicines Compendium. Voltarol Pain-eze tablets. March 2011. Available at <http://www.medicines.org.uk/emc/medicine/21170/SPC/Voltarol+Pain-eze%C2%AE+Tablets> (accessed on 20 November 2013).
17. Haag MD, Bos MJ, Hofman A, et al. Cyclooxygenase selectivity of nonsteroidal anti-inflammatory drugs and risk of stroke. *Archives of Internal Medicine*. 2008; 168: 1219-1224.
18. British National Formulary. Non-steroidal anti-inflammatory drugs: etoricoxib. Section 10.1.1. British Medical Association and Royal Pharmaceutical Society of Great Britain. Also available at <http://bnf.org> (accessed on 20 November 2013).
19. European Medicines Agency. Questions and Answers on the review of non-selective NSAIDs. October 2012. Available at <http://www.emea.europa.eu> (accessed on 20 November 2013).
20. Smidt N, Assendelft WJJ, van der Windt DAWM, et al. Corticosteroid injections for lateral epicondylitis: a systematic review. *Pain*. 2002; 96: 23-40.
21. Newcomber K, Laskowski E, Idank D, et al. Corticosteroid injection in early treatment of lateral epicondylitis. *Clinical Journal of Sport Medicine*. 2001; 11: 214-222.
22. Bisset L, Paungmali A, Vicenzino B, et al. A systematic review and meta-analysis of clinical trials on physical interventions for lateral epicondylalgia. *British Journal of Sports Medicine*. 2005; 39: 411-422.
23. Nimgade A, Sullivan M, Goldman R. Physiotherapy, steroid injections, or rest for lateral epicondylitis: what the evidence suggests (structured abstract). *Pain Practice*. 2005; 5: 203-215.
24. Boisauvert B, Brousse C, Zaoui A, et al. Nonsurgical treatment of tennis elbow. *Annales de Readaptation et de Medecine Physique*. 2004; 47: 346-355.
25. Bisset L, Beller E, Jull G, et al. Mobilisation with movement and exercise, corticosteroid injection, or wait and see for tennis elbow: randomised trial. *BMJ*. 2006; 333: 939.
26. Fink M, Wolkenstein E, Luennemann M, et al. Chronic epicondylitis: effect of real and sham acupuncture treatment. A randomized controlled patient- and examiner-blinded long-term trial. *Forsch Komplementarmed Klass Naturheilkd*. 2002; 9: 210-215.
27. Fink M, Wolkenstein E, Karst M, et al. Acupuncture in chronic epicondylitis: a randomized controlled trial. *Rheumatology (Oxford)*. 2002; 41: 205-209.
28. Molsberger A, Hille E. The analgesic effect of acupuncture in chronic tennis elbow pain. *British Journal of Rheumatology*. 1994; 33: 1162-1165.
29. Haker E, Lundberg T. Acupuncture treatment in epicondylalgia: a comparative study of two acupuncture techniques. *Clinical Journal of Pain*. 1990; 6: 221-226.
30. Woodley BL, Newsham-West RJ, Baxter GD, et al. Chronic tendinopathy: effectiveness of eccentric exercise. *British Journal of Sports Medicine*. 2007; 41: 188-198.
31. Selvanetti A, Barrucci A, Antonaci A, et al. L'esercizio eccentrico nella rieducazione funzionale dell'epicondilitis. *Medicina dello Sport*. 2003; 56: 103-113.
32. Pienimäki TTT. Progressive strengthening and stretching exercises and ultrasound for chronic lateral epicondylitis. *Physiotherapy*. 1996; 82: 522-530.

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33. Svernlöv B, Adolfsson L, Svernlöv B, et al. Non-operative treatment regime including eccentric training for lateral humeral epicondylalgia. *Scandinavian Journal of Medicine & Science in Sports*. 2001; 11: 328-334.
34. Martínez-Silvestrini JA, Newcomer KL, Gay RE, et al. Chronic lateral epicondylitis: Comparative effectiveness of a home exercise program including stretching alone versus stretching supplemented with eccentric or concentric strengthening. *Journal of Hand Therapy*. 2005; 18: 411-420.
35. Bisset L, Beller E, Jull G, et al. Mobilisation with movement and exercise, corticosteroid injection, or wait and see for tennis elbow: randomised trial. *BMJ*. 2006; 333: 939.
36. Jafarian FS, Demneh ES, Tyson SF. The immediate effect of orthotic management on grip strength of patients with lateral epicondylitis. *Journal of Orthopedic & Sports Physical Therapy*. 2009; 39(6): 484-489.
37. Struijs PAA, Smidt N, Arola H, et al. Orthotic devices for the treatment of tennis elbow (Cochrane review). In: *The Cochrane Library*. Wiley, Chichester, UK.
38. Karkhanis S, Frost A, Maffulli N, et al. Operative management of tennis elbow: a quantitative review. *British Medical Bulletin*. 2008; 88: 171-188.
39. Buchbinder R, Green SE, Youd JM, et al. Systematic review of the efficacy and safety of shock wave therapy for lateral elbow pain. *Journal of Rheumatology*. 2006; 33: 1351-1363.
40. Rompe JD, Maffulli N. Repetitive shock wave therapy for lateral elbow tendinopathy (tennis elbow): a systematic and qualitative analysis. *British Medical Bulletin*. 2007; 83: 355-378.
41. Staples MP, Forbes A, Ptasznik R, et al. A randomized controlled trial of extracorporeal shock wave therapy for lateral epicondylitis (tennis elbow). *Journal of Rheumatology*. 2008; 35: 2038-2046.
42. Bisset L, Paungmali A, Vicenzino B, et al. A systematic review and meta-analysis of clinical trials on physical interventions for lateral epicondylalgia. *British Journal of Sports Medicine*. 2005; 39: 411-422.
43. Bjordal JM, Lopes-Martins RA, Joensen J, et al. A systematic review with procedural assessments and meta-analysis of low level laser therapy in lateral elbow tendinopathy (tennis elbow). *BMC Musculoskeletal Disorders* 2008; 9: 75.
44. Trudel D, Duley J, Zastrow I, et al. Rehabilitation for patients with lateral epicondylitis: a systematic review (structured abstract). *Journal of Hand Therapy*. 2004; 17: 243-266.
45. Uzunca K, Birtane M, Tastekin N, et al. Effectiveness of pulsed electromagnetic field therapy in lateral epicondylitis. *Clinical Rheumatology*. 2007; 26: 69-74.
46. Crawford J O, Laiou E, Crawford JO, et al. Conservative treatment of work-related upper limb disorders: a review. *Occupational Medicine*. 2007; 57: 4-17.
47. Nirschl RP, Rodin DM, Ochiai DH, et al. Iontophoretic administration of dexamethasone sodium phosphate for acute epicondylitis. A randomized, double-blinded, placebo-controlled study. *American Journal of Sports Medicine*. 2003; 31: 189-195.
48. Paungmali A, O'Leary S, Souvlis T, et al. Hypoalgesic and sympathoexcitatory effects of mobilization with movement for lateral epicondylalgia. *Physical Therapy*. 2003; 83: 374-383.
49. Vicenzino B, Paungmali A, Buratowski S, et al. Specific manipulative therapy treatment for chronic lateral epicondylalgia produces uniquely characteristic hypoalgesia. *Manual Therapy*. 2001; 6: 205-212.
50. Kochar M, Dogra A. Effectiveness of a specific physiotherapy regimen on patients with tennis elbow: clinical study. *Physiotherapy*. 2002; 88: 333-341.
51. Smidt N, Assendelft WJ, Arola H, et al. Effectiveness of physiotherapy for lateral epicondylitis: a systematic review. *Annals of Medicine*. 2003; 35: 51-62.

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52. Kohia M, Brackle J, Byrd K, et al. Effectiveness of physical therapy treatments on lateral epicondylitis. *Journal of Sport Rehabilitation*. 2008; 17: 119-136.
53. Struijs PAA, Kerkhoffs GMMJ, Assendelft WJJ, et al. Conservative treatment of lateral epicondylitis: brace versus physical therapy. A randomised clinical trial. *American Journal of Sports Medicine*. 2004; 32: 462-469.
54. National Institute for Health and Care Excellence. Autologous blood injection for tendinopathy. January 2013. *Interventional procedure guidance 438*. Available at <http://guidance.nice.org.uk/ipg438> (accessed on 20 November 2013).

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