Beware of the Garden Strimmer and the Husbands DIY

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Abstract

Here is presented a case of a penetrating injury to the knee due to a garden power tool. This injury is the first to be described in the literature of a garden strimmer resulting in a penetrating foreign body within the knee joint. The root cause of this injury proved to be an ill advised do-it-yourself modification to the cutting mechanism of the strimmer. This was compounded by improper use and lack of safety precautions, along with an element of bad luck.

Case Report

A 47 year old woman presented to the accident and emergency department in the late evening. She was accompanied by her husband. Earlier in the afternoon, some 5 hours ago, she had been tending to the garden whilst wearing shorts. She had used a Black and Decker® garden strimmer to cut some grass. In her words, “something jumped up and hit me in the knee.” Since then she had had pain in her right knee and was unable to weight bear, fully flex or fully extend the knee. On further questioning it was found that the area she was strimming was free from rubbish or large stones. She had not twisted, fallen or struck the knee and did not remember the strimmer striking anything unusual. There had been no bleeding from the knee and she was not aware of any wounds when she had inspected her knee. Her husband was not able to offer anymore information, other than to say his wife was not one to complain. Her medial history was of diabetes and hypercholesterolaemia for which she took glicazide, metformin and simvastatin. She is a non smoker. On examination no swelling or deformity was noted a close surface inspection found an abrasion of around 1mm diameter over the centre of the patella tendon. She was tender over the patella, patella tendon and posterior joint line only. Flexion was limited to 15 degrees by pain and straight leg raise to 25 degrees by knee pain. She was not able to fully weight bear due to pain. In the absence of a clear cause but with definite clinical findings it was decided to x ray the knee. (figures 1 and 2)

On inspection of the radiograph a large wire shaped metallic foreign body was clearly visible penetrating into the knee joint. The origin of this wire was unclear. On further questioning the patient denied any other knee injury in the past and was perfectly fine until she had used the strimmer. She had not knelt on anything nor was there likely to have been any wire lying in the grass she was cutting.

It was at this point that her husband, rather hesitantly volunteered that, unknown to his wife, he had carried out some modifications to the strimmer to improve the cutting efficiency. He had replaced the factory fitted plastic wire blade with a coil of 2mm diameter steel wire. It appears that this wire had broken during operation of the strimmer and a fragment had been thrown from the rotating hub. To pierce the knee it must have first been thrown in the correct direction at the correct trajectory and the base of the strimmer must have been elevated from the ground to allow passage of the wire.

The patient was taken to theatre and the knee examined arthroscopically. A segment of steel wire around 3cm long was extracted from the joint and the joint thoroughly washed out.

Discussion

Foreign bodies within the knee are not an uncommon finding and the literature describes cases from glass to needles, plastic to pencil lead being removed from knees.[1-5] Injuries sustained in the garden from the use of lawnmowers are also commonly described. At present, only one report of an injury due to a garden strimmer is found in the PubMed database collection. This injury was a soft tissue loss caused by direct contact with the blade, which required reconstruction with a sural neurocutaneous flap.[6] This case is thus, the first report of an intra-articular foreign body due to the use of a garden strimmer.

The strimmer was introduced in the 1970’s. They are light and easy to operate. The principle behind their operation is that centrifugal force applied to a soft string will increase its stiffness proportional to its speed of rotation. This means a soft nylon cord of 2mm diameter is then capable of cutting through grass and small woody stems. A common problem is string breakage. This often occurs when a solid object is encountered at high speeds of string spin. The resulting impact bends and stretches the string...
resulting in a fracture and piece of string being cast free. Due to the design of the safety shield around the base of the machine, with correct operation the fragment should either hit the shield and be stopped from approaching the operator or be cast harmlessly to the side or in front of the machine. String breakage is an annoying problem as it renders the machine ineffective and it has to be stopped, and new sting wound out of the drum or worse, a new length of string fitted. With improper use it is possible that more than one breakage per session may occur. When looking at the flaccid string it seems reasonable to think that a stiffer, stronger material will make for more efficient strimming. A rigid wire however, may prove to be more brittle and prone to breakage.  
This unusual injury may have been preventable at as many as 3 different points. Firstly, by not modifying the mechanism of the strimmer to use wire not designed for the purpose. Secondly, by correct strimmer use, allowing the safety shield to be effective. Thirdly, by the appropriate use of protective clothing; such trousers to prevent scratches and cuts from any debris thrown off by the strimmer.  

## Conclusion

This injury is the first of its kind to be recorded in medical literature and is completely preventable. A series of events caused by improper use of machinery and inattention to safety turned a piece of wire into a projectile capable of causing a penetrating joint injury needing a hospital admission and surgery to remove. According to SIGN, the average cost of a hospital bed is £199 per night[7] Private providers of healthcare in the UK quote prices for knee arthroscopy in the order of £2000. Therefore, in order to save time changing string and a few pounds on its replacement, this DIY effort cost the NHS in the order of £2500  

## References

Illustrations

Illustration 1

Figure 1 AP radiograph of the right knee

Illustration 2

Figure 2. Lateral radiograph of the right knee
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