Introduction
Admiral Horatio Nelson is the ultimate hero of British naval history. The amputation of his right arm in July 1797 off the shore of Santa Cruz, Tenerife, is one of the most famous operations ever performed. Naturally British medical authors (2), (3), (4) have published concise accounts of the circumstances of this life-saving surgery. It has also attracted comment internationally in non-English medical journals (5), (6), (7). This article aims to revisit this epic surgery in detail, including post-op recovery and complications; and his psychological and physical rehabilitation.

Nelson’s injury
Nelson led the charge on the harbour mole just after midnight on 25th July. The Spaniards greeted this landing group with a hail of cannon and musket fire. Nelson was one of the first casualties, being struck in his right arm by grape shot fired from the canon El Tigre. His stepson Josiah Nisbett stemmed the haemorrhage with a tourniquet and returned him to the Theseus.

The surgeon
The amputation was performed by Thomas Eshelby (8). He was a 28 year-old Yorkshireman with three years experience as a qualified surgeon. His usual assistant George Henderson had not returned from the failed invasion that night. He therefore turned to Louis Remonier, a French royalist, who had been allowed to serve as surgeon’s mate.

The operation
Nelson was taken down to the cockpit which was cold, dimly lit and unsteady as the ship tossed on the waves. A Petit type of screw tourniquet (Figure 1) was applied to his arm. The ship’s standard scale of stores, at the time of the engagement, included six tourniquets(9). Each tourniquet comprised a cloth strap that was thrown around the limb and the screw tightened, compressing the limb between the two leather and cloth pads. The amputation instruments were cold and their action on his non-anaesthetised limb caused him much distress.

General
Lord Nelson’s trans-humeral amputation – a case report
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Fig 1: The tourniquet used on Nelson, and his spy-glass. Courtesy of the Wellcome Trust.
The median nerve crosses the brachial artery antero-medially in the arm close to the distal attachment of the coracobrachialis (10). The trans-humeral amputation was probably undertaken at this level. The evidence suggests that Eshelby inadvertently incorporated the nerve into the second reef-knotted ligature on the artery. He used silk instead of waxed thread which was the more common British practice. The ligatures were left long, to protrude beyond the level of the stump, so that they may eventually be removed by gentle traction at subsequent dressing changes. The team then attended to the other casualties, including a further trans-humeral amputation on a seaman named Holding (11).

Post-operative recovery
Nelson received a pill of two grams of opium as immediate post-op analgesic and recovered satisfactorily from his surgery (Figure 2). Eshelby’s daily progress notes are reproduced in (Figure 3). He subsequently received £36, while his assistant was paid 24 guineas for their care.

Constipation
Nelson received opium every night. This made him constipated (July 29th entry), which was apparently relieved by Senna and Jalap.

Dressing Changes
Eshelby changed the first dressing himself on July 27th, the 3rd post-op day, and was satisfied with the wound. One of the two ligatures separated with the next dressing change – approximately 5 days after the amputation. The second ligature was two inches proximal to the wound edge, in a rather short stump, and was therefore not “teased” at that point for fear of causing secondary haemorrhage.

Neurostenalgia (12)
Nelson returned to Bath, England in September. His wound was initially dressed by the local doctor and then by his wife. His stump pain persisted which required nocturnal laudanum (3). The Bath physicians theorised it was due to nerve(s) assimilated within the arterial ligature. A letter from his brother alludes to this: ‘I did this day meet Bayly a
Figure 3. Reproduction of the sections relevant to Admiral Nelson, from the Medical Journal of the Theseus 1797. Courtesy of the National Archives.
Swaffham surgeon, and esteemed a good one. I mentioned particularly the apparent pain in your right hand. He said it was a true sign of a nerve being taken up with the artery, indeed he says it is hardly possible to avoid it as there are so many and such small ones: that you must now have patience and all will do well, but he thinks the ligature had better not be forced too much... (13)

Stump infection
The Nelsons were perturbed by this additional problem and travelled to London to seek expert opinion. The Vice-Admiral consulted Dr Benjamin Moseley (Physician at the Royal Chelsea Hospital), William Cruikshank (Anatomist-Surgeon) and Thomas Keate (Surgeon-General to the Army). At the same time a fistula appeared along the tract of the persisting silk ligature. The stump became hot and swollen and had to be poulticed. The collective opinion however, was to avoid rushing into a debridement or stump revision.

Miraculous recovery
The recalcitrant ligature gave way suddenly on 3rd December 1797 and came away with the dressings. The stump healed rapidly thereafter and five days later Nelson sent a note to St George’s Church in Hanover Square bearing this statement ‘An officer desires to return Thanks to Almighty God for his perfect recovery from a severe wound, and also for the many mercies bestowed upon him.’

Mental strength
Nelson had displayed extreme courage and resilience in both the heat and aftermath of battle. He refused to be helped aboard the Theseus saying ‘I have got my legs left and one arm’. Midshipman Hoste (14) recalled seeing the admiral climbing into the ship with his left hand, right arm dangling by his side. His subordinates saluted him when he arrived on deck, to which he promptly replied left-handed (15). He had intuitively realised that an amputation was the only option, so he asked Eshelby to prepare for immediate surgery. Asked how to dispose of his amputated arm, he retorted ‘throw it into the hammock, with the brave fellow that was killed beside me’ (16).

Depression and recovery
The simultaneous realities of his military defeat and personal loss, began to sink in afterwards. Despondency made him scribble with his reacquainted left hand ‘I am become a burthen to my friends and useless to my Country’ (13). However he felt a bit better when he boarded the Seahorse, and on his return journey home. His peers and friends were encouraging and supportive, as was a royal audience and financial recompense. Events later in life helped him recover psychologically and cope with his disability. His return to active command in December, subsequent maritime victories, and the companionship of Lady Hamilton were the more significant of these. Indeed he grew fond of his stump. He nicknamed it as his ‘fin’ and would use it humorously to identify himself to strangers (17).

Phantom pains
There are allusions to occasional phantom limb pain later on in Nelson’s life, possibly related to changes in the weather. The stump also helped his subordinates in ascertaining his mood, as it twitched when he was angry: ‘The admiral is working his fin,’ they would say. ‘do not cross his hawse, I advise you!’.

Physical rehabilitation
Nelson had written a letter left-handedly to his commanding officer, Earl St Vincent, within 48 hours of his amputation. He added the following post-script ‘you will excuse my scrawl considering it is my first attempt’ (13). His spidery script however improved considerably over the coming years, becoming characteristically horizontal and evenly spaced (18).

Nelson began using a combined knife and fork. At least three of these implements are preserved to date, all engraved with the initial ‘N’. The National Maritime Museum exhibits a silver three-pronged fork set in an ivory handle. A steel blade is attached to the lower prong by a screw, as shown in Figure 4.

A similar utensil was possessed by the descendents of Nelson’s sister - Catherine
Matcham. This seven inch long three-pronged fork has a worn out blade affixed by a slightly different screw assembly and was auctioned by Sotheby’s in October 2005 for £52,800 (19). The Nelson Collection at Lloyds of London includes a high carat gold example of fiddle and thread pattern, with a steel blade set into the fourth tine of the fork (20). There is evidence that similar adjustments were made in personal items of clothing and furniture in order to facilitate his rehabilitation.

This case report illustrates Nelson’s characteristic resolve and courage, and how these attributes influenced his recovery and rehabilitation against a background of immense personal loss and complicated surgery.

References

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