The Royal Society of Medicine

Journal of the Royal Society of Medicine; 2015, Vol. 108(11) 457–461
DOI: 10.1177/0141076815612639

Ambroise Paré's accounts of new methods for treating gunshot wounds and burns

IML Donaldson
University of Edinburgh & Royal College of Physicians of Edinburgh, Edinburgh EH2 1JQ, UK
Corresponding author: IML Donaldson. Email: i.m.l.d@ed.ac.uk

Introduction

In 1537, France was at war with the Holy Roman Emperor, Charles V, for the third time. The French expedition into Piedmont went to relieve the siege of Turin and occupy territory whose title was disputed by François I, the French king. The commander of the French infantry sent into northern Italy was the Marshal de Montejan, and he was accompanied by a young French surgeon, Ambroise Paré.

Paré was about 27 years old and had recently been practising as a surgeon in the Hôtel Dieu in Paris. He had not yet been 'sworn' (registered) as a surgeon; still less did he have any academic qualifications. His origins were relatively humble and he could read neither Greek nor Latin.

Over the course of his long life (1510–1590) Paré published several accounts of his discoveries about how best to treat gunshot wounds (in 1545, 1552, 1564, 1575 and later editions of his *Oeuvres*). These accounts differ in minor details but not in any essentials.

The passages discussed here are from the first edition of his *Oeuvres* (works), which he published in 1575 in his native French.[1] His discoveries are recorded in a separate chapter in this first edition entitled 'Commentary on the book about wounds made by hackbuts and other firearms', and at the beginning of the Third Book of the *Oeuvres*, which is devoted to the treatment '…. of wounds made by the arquebus and firearms, arrows and darts' [a hackbut/arquebus is a portable gun fired from a stand]. In this introductory chapter Paré details how he discovered methods that were better than those used by his contemporaries for treating gunshot wounds and burns – particularly those caused by gunpowder.

Later in the chapter he describes how he discovered the greater efficacy of a paste of onions for treating burns, particularly those made by gunpowder, rather than the then conventional 'cooling remedies'.

Treatment of gunshot wounds without cauterization

The principal authority on the treatment of gunshot wounds, which were a relatively new type of injury, was Giovanni da Vigo (1450?–1525), surgeon to Pope Julius II. Vigo's surgical compilations were standard texts in the 16th century. His work is in two sections: the *Copiosa*, first published in 1514,[2] and the *Compendiosa*, first published in 1517.[3] After 1517, most editions of Vigo – and there were many – contained both the *Copiosa* and the *Compendiosa* (the latter is a much more succinct account of the material). The combined work was translated from Latin into French by Nicolas Godin in 1525,[4] and it is to this translation that Paré refers in the passage on page 358 of the first edition of his *Oeuvres*.

Vigo discusses gunshot wounds in both the *Copiosa* and the *Compendiosa*. In the former, he describes his reasons for believing that gunshot wounds are poisoned by the effects of the gunpowder and so present particular difficulties in treatment. In the latter, he summarises their treatment in much less detail. It is to this latter passage, in the *Compendiosa*, that Paré refers when he quotes Vigo's instructions that gunshot wounds must be cauterized with hot oil to prevent the patient being poisoned.

Interestingly, the remedy that Paré used when he ran out of oil, and which proved so much less damaging, is one of those that Vigo recommends for use after the gunshot wound has been cauterized. He gives much more detailed instructions for the management of these wounds, including the recipe for this salve, in his *Copiosa*, book III, chapter III, than there are in the *Compendiosa*.

Paré's account of the 'natural' experiment that led him to reject Vigo's methods reads as follows:[1]

> Now, at that time I was very inexperienced because I had not yet seen the treatment of wounds made by the arquebus; it is true that I had read in the first book of Jean de Vigo about wounds in general,

> chapter 8, that wounds made by firearms are poisoned because of the powder and for their cure he commands that they be cauterized with oil of elderberry to which a little treacle should be added. Not to fail in the use of this burning oil and knowing that such treatment could be extremely painful for the wounded, I wanted to know before I used it how the other surgeons carried out the first dressing; this they did by applying the said oil as nearly boiling as possible to the wounds using tents and setons so I plucked up courage to do likewise.
>
> At last I ran out of oil and was constrained to apply a digestive made of egg yolk, oil of roses and turpentine. That night I could not sleep easily thinking that by the default in cautery I would find the wounded to whom I had failed to apply the said oil dead of poisoning; and this made me get up at first light to visit them. Beyond my hopes I found those on whom I had put the digestive dressing feeling little pain from their wounds which were not swollen or inflamed, and having spent quite a restful night. But the others, to whom the said oil had been applied, I found fevered, with great pain and swelling around their wounds.
>
> From then I resolved never again so cruelly to burn poor men wounded with arquebus shot.

Paré's observation that avoiding cauterization of gunshot wounds is not only better because it greatly reduces the patients' suffering, but is also less damaging, is striking enough in itself; but, in the context of its time, the use he made of his observation is even more remarkable. It is no coincidence that it was his teaching on this subject that was the foundation of his reputation and his career. Paré was a young surgeon with no formal qualifications who was not even registered as one of the least prestigious of the medical practitioners, the barber-surgeons. That he dared to publish his experience when it flatly contradicted the established academic authority on the subject must have required not only remarkable self-confidence, but a good deal of courage.

It is not difficult to imagine that most young men in his position who ran out of cauterizing oil would have been greatly relieved that their patients were not harmed – as indeed Paré tells us he was – but most would have kept quiet about it. Indeed, we do not know that some anonymous surgeon may not have done exactly that before Paré. Paré's large measure of common sense, acute observation, compassion and the courage and confidence to be persuaded by his own observations of the errors of authority and of popular belief, shine out from his writings and were not disregarded in his own time. From his humble beginnings he became surgeon-in-chief to four kings of France and the most famous surgeon of his generation.

Paré published his first account of his discovery in 1545 – encouraged, as he says, by Sylvius (of whom more below).[5] This first work on gunshot wounds was followed in 1552 by a much enlarged work on the same topic, and the new method of treating gunshot wounds was rapidly adopted across Europe.[6] But Paré wrote in French and so his written works were inaccessible to many surgeons of other countries. In his dedication of the first translation of Paré's collected works into Latin – the *Opera* of 1582 – Paré's friend and former pupil Jacques Guillemeau, a fine classicist, cites the desire of foreign surgeons for a Latin version of Paré's works as one of the principal reasons for the publication of the translation. One may feel somewhat sceptical about whether this was really the whole explanation – there is no doubt that Paré was anxious to enhance his reputation as an academic as well as a practical surgeon. But there is also no reason to doubt the veracity of Guillemeau's brief and charming tale.

Guillemeau, like his master, had followed the armies across Europe, and writes[7]:

> . . . I carefully took note how those whom I met in the hospitals, Italian, German and Spanish surgeons distinguished both by their reputation and their works, went about their treatment. And I saw that they all followed only Paré's example. Those who knew no French had some pieces from his works, collected with much care by those who were skilled in Latin, that they carried with them as their viaticum.

It is no exaggeration to say that Paré's discovery and his publication of it revolutionised the treatment of gunshot wounds in 16th century Europe.

Trial of treating burns with onions

To some of his accounts of the discovery that gunshot wounds do not need to be cauterized, Paré adds a description of how he tried and tested a folk remedy for the treatment of burns. In the *Oeuvres* Paré describes how, when he returned to Paris after the death of his master, de Montejan, the news of his new treatment of gunshot wounds began to spread. Jacques Dubois (1478–1555), latinised as Sylvius, appears to have been Paré's master in Paris and had employed him to carry out blood-letting – a task which, as a physician, he would have delegated. Sylvius was a hot-headed Picard, a well-known and influential academic physician, humanist and teacher of anatomy. He was an active protagonist of Galen's anatomy who strongly disapproved of the criticisms

of Galen by his former pupil Vesalius, in the latter's new anatomical works.

Sylvius invited Paré to dine with him and tell him about his discoveries. Paré explained why he had concluded that gunpowder does not poison gunshot wounds (as suggested by Vigo), and went on to discuss burns caused by gunpowder. This led him to the story of the onion treatment:[1]

> . . . as for burns caused by gunpowder, I have never found anything special that distinguishes their treatment from that of other burns.
> I then told him [Sylvius] this story about a kitchen boy of monsieur le Marshal de Montejan who fell into a cauldron of almost boiling oil. When this happened I was sent for and at once went to ask an apothecary for the refrigerant medicines that one was accustomed to apply to burns. A good old village woman, hearing that I was speaking of this burn, advised me to apply, for the first dressing, (for fear that pustules or blisters would result), raw onions crushed with a little salt; I asked the old woman if she had used this in the past and she answered, in her dialect, 'Yes, sir, by God's faith'. Then I was agreeable to trying the experiment on this kitchen scullion; and, truly, the next day, the places where the onions had been had no blisters or pustules, and where they had not been all was blistered.
> Some time later a German of the guard of the said seigneur de Montejan was very drunk and his flask caught fire and caused great damage to his hands and face, and I was called to dress him. I applied onions to one half of his face and the usual remedies to the other. At the second dressing I found the side where I had applied the onions to have no blisters nor scarring and the other side to be all blistered; and so I planned to write about the effects of these onions.

The striking feature of the account is the comparison between the effects of onions and those of other treatments. In the first case, of the scullion, we are told only that in the places where the onion paste was not used there were blisters, but there were none where it had been applied. One supposes that this opportunity for comparison of treated and untreated areas probably arose as a chance effect of how the onion paste was applied. But in the second case, of the soldier whose powder flask had gone on fire, Paré records that he quite intentionally treated one side of the burnt face with onions and the other with 'the usual remedies' and that there was a very marked difference between their effects. This intentional use, in either 1537 or 1538 (see Martin[8] and Appendix), of a direct comparison of two treatments applied in closely comparable conditions is one of the earliest known accounts of a controlled comparison of alternative treatments – for all that it was apparently made in only one patient.

Although Paré says no more about the onion treatment in the *Oeuvres*, he had, it seems, tested the remedy on more burned patients. Sigerist[9] points out that, in his original little book on gunshot wounds of 1545, Paré used onions to treat a number of soldiers burnt by a train of gunpowder. The 1545 edition and the second edition, of 1552, contain the following account which accords exactly with Sigerist's comments (he does not give a detailed translation). Here is a translation of Paré's account from the 1552 edition, page 45:

> In the first place, I have seen by my own observations that the said onions have achieved marvels, particularly when I dressed several soldiers in Piedmont who had been burned by a train of gunpowder that the enemy had set during the assault on the castle of Villane. And I can assure you that when I was able to apply the onions in the manner aforesaid there arose no blisters nor pustules as there did in the other [patients] in whom the said remedy was not used.

But in this earlier account the stories of the scullion and the soldier with the exploding flask do not appear. Presumably the treatment with onions at the siege followed the observations on the scullion since the latter passage makes it clear that Paré had not used onions before and was told of the treatment by an old woman when he went to get the usual 'cooling remedies' to treat the boy.

Paré never seems to have collected all his observations in a single account. To discover that he had made comparisons of the effectiveness of onion paste both in two groups of patients and on the two sides of a burn in a single patient we have to collate the information from his early and his later accounts.

It is perhaps tempting to conclude that, in what Paré probably considered to be the definitive publication of his works – we know that he spared no pains or expense on the production of the 1575 *Oeuvres* – he included only what he felt was the 'best' evidence of the efficacy of the onion paste, that of direct comparison with older remedies, on the same burn in the same patient. Though this conclusion would sit well enough with what we know of Paré's fondness for, and reliance on, his own direct observations to guide his practice and teaching, it is also true that he is not inclined to spare his reader multiple examples of his experience. In any case, wishing opinions on a sixteenth century writer

about what type of evidence he might have thought 'best' is quite unjustifiable.

Treatment of burns with onions was taken up and recommended by others; for example, Laurent Joubert (1529–1582). Joubert was, for a time, Chancellor of the Medical Faculty of Montpellier; but he was a controversial figure because he published medical material in French, thus making it accessible to those of the literate general population who lacked Latin. In his book on the treatment of arquebus wounds, Joubert[10] writes:

> But nothing is as good as raw onion pounded with a little salt and applied, or a cloth soaked with the liquid expressed from it. It is a remarkable treatment used before there is any blistering, provided the burn is not near the eyes where it would be very painful: otherwise, and in other places, it is not [painful].

The onion treatment was recommended by the English surgeon William Clowes,[11,12] and, on the basis of marginal notes referring to Paré, it is difficult not to conclude that Clowes took the onion treatment from Paré's published work. The following century, another English surgeon, Richard Wiseman,[13] referred to the onion treatment. In the accounts that do not claim to be translations from Paré, it is perhaps possible that a folk remedy was the source rather than Paré's published observations. But where the accounts accompany denials that gunshot wounds are poisoned it seems probable that the onion treatment as well as the treatment of gunshot without cauterization derives from Paré.

Much more recently, in 1944, Sigerist again drew attention to Paré's discovery; he discussed the use of onions by Clowes, Wiseman and others – though not Joubert – and suggested, on the basis of Russian observations in the Second World War, that it would be worth examining whether substances in onion juice have a beneficial effect on the healing of burns.

As far as I have been able to ascertain, however, none of the later authors refers in any way to testing the efficacy of onion treatment or to comparisons with other treatments for burns. In making these comparisons and basing his recommendation on the outcome, Paré is unique.

Appendix: The dates of Paré's observations on the treatment of gunshot wounds and trials of a new method of treating burns

In his *Oeuvres* of 1575 Paré describes how, after forcing the Pass of Suse in October 1537, the French army besieged and took the castle of Villane to avoid leaving a substantial force in its rear as it proceeded to Turin. The account of the observations on gunshot wounds follows immediately and the implication is that these events also took place during or immediately after the siege. Martin's account of the campaign makes clear that Turin was taken, with its surrounding hinterland, soon after the forcing of the pass.[8] It would appear that the discovery that cauterization of gunshot wounds was not only unnecessary but was actually harmful was made before the end of 1537. This is made even more likely since, at that time, the French New Year began on 25 March (it returned to its ancient date of 1 January 1564). Thus 1537 would have ended in the March following the forcing of the pass.

The account of the discovery and trials of the effectiveness of onion paste for the treatment of burns, particularly those from gunpowder, follows a little later in the chapter in Paré's[1] *Oeuvres* and, if only this source were considered, it would appear to postdate the observations on gunshot wounds by some months. In his earlier accounts of the discoveries, in 1545 and 1552, however, Paré describes his use of the onion paste at the siege of Villane to treat several men burned by a gunpowder train. Since it is also quite clear that his first use of this remedy was on de Montejan's kitchen boy and was at the suggestion of an old woman, this first use must antedate the siege of Villane and so must be close in time to the observations on gunshot wounds; it may even have preceded them.

At Villane Paré also compared the effect of the onions to that of other treatments and noted the absence of blisters when the onion paste was used; several men were treated with each method.

The timing of the observation on the man burnt by the exploding flask, when Paré treated half the face with onions and compared it to the other side treated with some other (unspecified) remedy, cannot be tied down precisely. Paré does not describe it in his earlier accounts and, in the 1575 *Oeuvres* says, after the account of the kitchen boy's treatment, that he treated the man whose flask exploded 'some time later…'. However, de Montejan was still alive so the episode took place before late 1538. We cannot tell whether it occurred before or after the treatment at Villane. If it was after, one might speculate that, having seen the benefit of the use of onion paste compared to other treatments, each treatment used on several men, Paré decided to use the burnt face to provide a comparison of a different kind, of the two treatments on the same burn in the same patient. More probably, he just made use on each occasion of what the situation offered.

Declarations

Competing interests: None declared

Funding: None declared

Ethical approval: Not applicable

Guarantor: IMLD

Contributorship: Sole author

Provenance: Invited article from the James Lind Library

References

1. Paré A and Les oeuvres de M. *Ambroise Paré conseiller, et premier chirurgien du Roy avec les figures & portraicts tant de l'Anatomie que des instruments de Chirurgie, & de plusieurs Monstres*.... Paris: Gabriel Buon, 1575.
2. Vigo G de. *Practica in chirurgia: Practica in arte chirurgica / copiosa Joánis de Vigo*. Rome: Impressum per Stephanú Guillineti [et] Herculem Bononiensem, 1514.
3. Vigo G da. *Pratica in professione chirurgica. Compendiosa nuncupata novissime compilata a Iohanetino De Vigo Ianuensi olim Iulii secundi pon. max. nunc vero Sixti t.s.p. advincula cardinalis sacrosanctae Ro. Eccle. vicecancellarii chirurgo. Quequidem libris quinque constare videtur. In primo de vulneribus. In secundo de apostematibus. In tertio de ulceribus. In quarto de auxiliis appropriatis uniquique membro a capite usque ad pedes & morbis eorum. In quinto finem faciendo agit de variis & diversis auxiliis sub ordine antidotarii & de parva chirurgicum capsia navigantium per eorum commoditatem*. Roma: per Giacomo Mazzocchi, 1517.
4. Vigo G de. De Vigo en françoys: sensuit la practique et cirurgie de tres excellent docteur en medecine Maistre Jehan de Vigo / nouvellement translatee de latin en françoys a lutilité publique, et *principalement des cirurgiens: et est divisées en deux parties*..... Trans. Godin N. Lyon: Benoist Bounyn, 1525.
5. Paré A. *La Méthode de traicter les playes faictes par hacquebutes et aultres bastons à feu et de celles qui sont faictes par flèches, dardz et semblables, aussy des combustions spécialement faictes par la pouldre à canon, composée par Ambroyse Paré,*.... Paris: V. Gaulterot, 1545.
6. Paré A. *La maniere de traicter les playes faictes par hacqeubutes, que par fleches: & les accidentz d'icelles, cõme fractures & caries des os, gangrene & mortification: avec les traictz des instrumentz necessaires pour leur curation. Et la methode de curer les combustions principalement faictes par la pouldre a canon*. Paris: Par Arnoul l'Angelié, 1552.
7. Paré A. *Opera Ambrosii Parei,... a docto viro plerisque locis recognita, et latinite donata, Jacobi Guillemeau,... labore & diligentia*. Paris: Jacobum Du-Puys, 1582. sig.ã ij.
8. Martin H. *Histoire de France depuis les temps les plus reculés jusqu'en 1789*. Vol VIII. 4th ed. Paris: Furne, 1857, p. 248, entry for the year 1537.
9. Sigerist HE. Ambroise Paré's onion treatment of burns. *Bull Hist Med* 1944; 15: 43–149.
10. Joubert L. *Traitté des arcbusades, contenant la vraye essence du mal, et la propre curation, par certaines et méthodiques indications, avec l'explication de divers problèmes touchant cette matière/par Laurens Joubert,*.... Lyon: Jean de Tournes, 1574, p.208.
11. Clowes W. *A profitable and necessarie booke of obseruations, for all those that are burned with the flame of gun powder, &c... Imprinted at London: By Edm. Bollifant, for Thomas Dawson*. London: E. Bollifant for Thomas Dawson, 1596, pp.2–5.
12. Clowes W. *A prooued practise for all young chirurgians, concerning burnings with gunpowder, and woundes made with gunshot*. London: Printed by Thomas Orwyn, for Wydow Broome, 1591, p.5.
13. Wiseman R (1676). *Several chirurgical treatises by Richard Wiseman* ... London: Printed by E Flesher and J Macock, for R Royston ... and B Tonk ..., 1676, p.440.