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MEDICO-LEGAL ISSUES IN WOUND MANAGEMENT

Susan Webber*

Introduction

Medico-legal issues in wound management can arise when a patient who is suffering from a penetrating or crushing wound or from a compound fracture (one in which the bone protrudes through the skin) seeks the treatment of a physician or surgeon who does not adequately debride (remove the devitalized tissue and foreign matter) the wound, thereby leaving it contaminated with dead tissue, foreign matter, or bacteria. Perhaps he closes the wound by suture or skin graft, and perhaps he administers antibiotics or anti-tetanus injections. Infection develops or the wound fails to heal properly.

The attorney representing the patient in a suit against the treating physician must determine the medical standards for wound treatment, including those for proper debridement, closure, and administration of medication. Ascertaining these standards is not easy, as many factors of wound management must be considered. If the attorney determines that the physician violated these standards, he must then determine whether the patient's condition was proximately caused by the failure of the physician to exercise the proper standard of care. Proximate cause is often difficult to prove, as the patient's condition is nearly always partially attributable to the initial wound. Even if the attorney can prove violation of the standard of care and proximate cause, he might have to face the defense of the statute of limitations. This article explores the medical and legal issues which could arise in such a case.

1. Medical Aspects

The importance of debriding a wound¹ has been known to physicians for at least two centuries.² Yet the standards for debridement and closure of wounds vary according to a number of factors, including the type of wound and the physical condition of the patient.

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1. The type of wound discussed herein is not a surgically inflicted one. In this context such "deliberate" wounds have been distinguished from "inadvertent" ones. See Brown, *The Prevention of Infection in Open Wounds*, 96 *Clinical Orthop.* 42, 43 (1973).

2. For a thorough examination of the development of standards for debridement and closure, see Wangenstein & Wangenstein, *Military Surgeons and Surgery, Old and New: An Instructive Chapter in Management of Contaminated Wounds*, 62 *Surgery* 1102 (1967). See also Wangenstein, letter to the editor, 76 *Surgery* 347 (1974).

a. *The Development of Medical Knowledge in Wound Treatment*

Medical understanding of the nature of the open wound has become more sophisticated with every war in western civilization at least since the time of Napoleon.³ Debridement as a surgical procedure had been established by the end of the 1700's, and physicians during the Franco-Prussian and the Spanish American Wars learned that early wound closure, which inhibits drainage, contributes to problems of infection.⁴

Unfortunately, what was learned in one war was not generally retained for the next; the same mistakes in wound management have been made anew and the lessons of prior wars relearned.⁵ For example, an article published in 1919 has been described as "one of the best studies ever done on open wounds of the joints" and has been "re-examined" only in recent years.⁶

The pattern of forgetting the lessons of wound management learned in prior wars was continued through the Korean War, in which United States medical facilities were run by physicians who were not skilled or experienced in the treatment of war wounds. However, after a few months there were fewer incidents of gas gangrene (death of tissue resulting from bacterial invasions in which muscle and subcutaneous tissues are filled with gas), wound breakdown (failure to heal properly), and infection, which conditions are attributable to inadequate debridement and premature closure. Only with the war in Viet Nam were the lessons of prior wars applied from the beginning.⁷

b. *Standards for Debridement*

All open wounds have three characteristics in common: (1) they *are* contaminated by living organisms; (2) they *may be* contaminated by a foreign body; and (3) they involve a certain degree of tissue injury.⁸ The first step in the care of any wound is debridement, which can be very simple or extremely difficult, according to the severity of the characteristics listed above. For example,

[t]he person who slices his finger open on a paper edge and promptly pops his finger into his mouth is performing a very sim-

3. See generally Wangenstein & Wangenstein, *supra* note 2.

4. Burkhalter, *Open Injuries of the Lower Extremity*, 53 *Surgical Clinics of North America* 1439 (1973).

5. Brown, *supra* note 1, at 43.

6. *Id.* at 50 n.10 (commenting on Willems, *Treatment of Purulent Arthritis by Wide Arthrotomy Followed by Immediate Active Mobilization*, 28 *Surg. Gynec. Obstet.* 546 (1919)).

7. Brown, *supra* note 1, at 44.

8. Burkhalter, *supra* note 4, at 1439.

ple and usually very effective debridement. The finger cut with a kitchen knife and then held under flowing tap water is usually well debrided. On the other hand, the high explosive missile wound with multiple foreign bodies and other contaminants blown through muscles and along fascial (fascia is fibrous tissue beneath the skin which separates the skin from muscles or body organs) planes, and with tissues of all degrees of viability, presents a problem requiring a surgeon with experience, judgment, patience, and the proper facilities for thorough debridement⁹

Since infection ("a pathologic, *i.e.* harmful, process caused by the growth of micro-organisms in living tissue"¹⁰) can occur within a short time after the wound, it is best to debride within four to six hours after injury.¹¹ The debridement should begin with cleansing the wounded area with soap and water.¹² Any agent that has strong anti-bacterial or detergent qualities should be kept out of the wound itself, as it acts upon healthy tissue as well as upon harmful bacteria.¹³

A careful examination of the wound is the next step, for which the wound might have to be surgically enlarged.¹⁴ All dead or badly damaged skin and muscle tissue should be cut out.¹⁵ Any fascia encountered is removed because it is avascular (without blood vessels) and is a very susceptible host to bacteria. "Compromise with ideal debridement" is often called for with respect to tendons, nerves, and blood vessels; they should be cleansed but not removed unless they are avascular or avulsed (torn away).¹⁶ There seems to be a split of medical opinion as to whether bone fragments should be removed.¹⁷ When it is obvious that an extremity is irreversibly

9. Brown, *supra* note 1, at 45-46.

10. *Id.* at 42.

11. Committee on Trauma, American College of Surgeons, *Early Care of the Injured Patient* 34 (1972)[hereinafter cited as Committee on Trauma].

12. Brown, *supra* note 1, at 46.

13. *Id.* In one study the use of two common surgical scrubs on contaminated wounds was shown actually to increase susceptibility to infection. See Custer, Edlich, Prusak, Madden, Panek & Wangenstein, *Studies in the Management of the Contaminated Wound*, 121 *Am. J. Surg.* 572, 573 (1971) [hereinafter cited as Custer].

14. Brown, *supra* note 1, at 46.

15. *Id.* For a discussion of how to discern dead from living tissue, see Boswick, *Wound Care*, 55 *Postgrad. Med.* no. 1, 171 (1974). Another authority notes that irreversibly injured muscle tissue is not always detectable at the time of initial debridement. Burke & Bondoc, *A Method of Secondary Closure of Heavily Contaminated Wounds Providing "Physiologic Primary Closure,"* 8 *J. Trauma* 228 (1968).

16. Brown, *supra* note 1, at 46.

17. Compare Brown, *supra* note 1, at 46 (even detached bone fragments should never be removed but should be scrubbed and left in place) with Committee on Trauma, *supra* note 11, at 35 (detached bone fragments should be removed).

damaged, the only effective form of debridement is amputation.¹⁸

Foreign bodies, especially organic material, should be removed. Bullets and shell fragments should be removed if they are encountered, or if they are near nerves or large blood vessels or within joints. However, they need not be "fanatically searched for."¹⁹

The last step of debridement is to wash the wound again to cleanse it further from bacteria and remove tiny pieces of dead tissue and small foreign objects. This washing may be done with a thin stream of sterile saline solution²⁰ under mild pressure. A suspended enema with an eyedropper at the end of the rubber tube or a mechanism similar to the dental water pick has been suggested. The wound should not be flooded with large quantities of liquid, but "its interstices and hidden planes and pockets" should be explored.²¹

The extent of debridement is governed partially by the location of the wound on the body. Wounds on the face and hands should be debrided conservatively, as they have structures that are necessary for both appearance and function. On the other hand, large wounds of the extremities may require extensive debridement.²² Another consideration important in determining the extent of debridement is the overall condition of the patient at the time the physician treats him. For example, when the physician is treating the patient for hemorrhage or severe shock, prompt and adequate debridement of his wounds is not a primary consideration.²³

c. *Standards for Wound Closure*

After a physician has debrided a wound, he must decide whether to proceed with primary closure (immediate closure), to wait and perform delayed primary closure (closure at any time before the formation of granulation tissue), to wait and perform secondary closure (closure after granulation tissue has formed), or to permit the wound to heal without closure. His decision should be based upon the possibility of infection developing after closure.²⁴ Managing the wound over a period of time permits the physician to check the open wound to determine whether it is ready to be closed;

18. Committee on Trauma, *supra* note 11, at 35.

19. Brown, *supra* note 1, at 46.

20. Custer, *supra* note 13, at 573 (scrubbing a contaminated wound with saline "provided no significant protection against the development of subsequent infection").

21. Brown, *supra* note 1, at 46.

22. Committee on Trauma, *supra* note 11, at 35.

23. *Id.* at 34.

24. Brown, *supra* note 1, at 48.

if there is any doubt, it should not be closed.²⁵ Closure of wounds by whatever means is an elective procedure, to be performed only when the physician has "a firm conviction, without reservation or compromise," that uninterrupted healing will follow.²⁶ One definite advantage in delayed closure is that it gives the physician a later chance to debride the wound of tissue that has become necrotic (dead) since the initial debridement.²⁷ Healing by secondary intention (healing by the adhesion of granulation tissues) is a less severe complication than sepsis (poisoning caused by decaying tissues) or wound breakdown caused by premature closure.²⁸

In making his decision to close the wound, the physician must consider several conditions which influence the degree of infection and the process of healing.

(1) *The Thoroughness and Timing of Debridement*

Retained dead or devitalized tissue has been called "the pabulum of sepsis."²⁹ Debridement results in a less favorable environment for harmful bacteria to multiply. Since the extent of devitalized tissue is not always known,³⁰ the physician should abstain from primary closure unless there is little tissue injury and foreign debris.³¹

The physician should also consider how much time has lapsed between the injury and the debridement, as infection can develop quite rapidly.³² One authority maintains that the time factor is important only in those wounds that are contaminated with rapidly spreading or dangerous bacteria, claiming that "little evidence supports the concept that a specific time lapse after injury precludes certain types of care."³³ Other authorities maintain that there should be no primary closure after a lapse of six to eight hours³⁴ or perhaps as short as three hours.³⁵

25. Burkhalter, *supra* note 4, at 1440.

26. Brown, *supra* note 1, at 47.

27. Hampton, *Editorial—Management of Open Fractures and Open Wounds of Joints*, 8 J. Trauma 475, 476 (1968).

28. Brown, *supra* note 1, at 47-48.

29. Hampton, *supra* note 27, at 475.

30. Boswick, *supra* note 15, at 171; Burke & Bondoc, *A Method of Secondary Closure of Heavily Contaminated Wounds Providing "Physiologic Primary Closure,"* 8 J. Trauma 228 (1968).

31. Brown, *supra* note 1, at 47; Burkhalter, *supra* note 4, at 1440.

32. Brown, *supra* note 1, at 47.

33. Boswick, *supra* note 15, at 172.

34. Brown, *supra* note 1, at 47.

35. Duke & Krizek, *Civilian Wounds, Their Bacterial Flora and Rate of Infection*, 23 Surg. For. 518, 519 (1972).

(2) *The type of wounding agent and its velocity.*

If the physician knows the wounding agent and its velocity, he can be better apprised of the possibility of infection and the extent of tissue damage.³⁶ If the wound is known or suspected to have been greatly contaminated (such as a butchershop cut), surgical repair, even to tendons and nerves, should be delayed.³⁷ Knowing the type and circumstances of injury will also aid the physician in planning an anesthetic and X-rays if these are required.³⁸ However, many foreign objects which can become imbedded in wounds cannot be discovered through X-rays.³⁹

(3) *The Virulence, Types, and Numbers of the Contaminating Bacteria*⁴⁰

Cultures may be taken of wounds and the organisms identified so that the proper antibiotic can be prescribed if one is needed.⁴¹ If there is a probability that the wound is highly contaminated or if cultures show a high degree of contamination, the physician should not perform primary closure. At least one study of nonmilitary wounds has indicated that there is a direct relationship between the bacterial counts in wounds and successful primary healing, especially when the wound is over three hours old before treatment.⁴²

(4) *The Anatomic Location of the Wound*⁴³

Different tissues have different degrees of resistance to infection,⁴⁴ and some tissues, such as bone fascia and tendon, die if they remain exposed⁴⁵ or unmoistened.⁴⁶ Furthermore, abdominal and thoracic wounds may also be contaminated from endogenous (from

36. Committee on Trauma, *supra* note 11, at 33. One study suggests that soil itself inhibits healing and promotes infection. Rodeheaver, Pettry, Turnbull, Edgerton & Edlich, *Identification of the Wound Infection Potentiating Factors in Soil*, 128 Am. J. Surg. 8 (1974).

37. Boswick, *supra* note 15, at 173.

38. *Id.* at 172.

39. Interview with Laurence Jones, M.D., at University of Arkansas Student Health Center in Fayetteville, Arkansas (February 3, 1975).

40. Committee on Trauma, *supra* note 11, at 34.

41. Boswick, *supra* note 15, at 175.

42. Duke & Krizek, *Civilian Wounds, Their Bacterial Flora and Rate of Infection*, 23 Surg. For. 518, 519 (1972).

43. Committee on Trauma, *supra* note 11, at 34.

44. *Id.*

45. Hampton, *supra* note 27, at 475.

46. Brown, *supra* note 1, at 49. *Accord*, Boswick, *supra* note 15, at 173 (the physician can cover the highly contaminated wound with a sterile dressing and determine the extent of tendon and nerve damage through motor and sensory tests).

inside the body) sources when there has been perforation of the alimentary, genitourinary, or respiratory tracts.⁴⁷

(5) *The Degree of Circulation Impairment*

The vascularity and type of injured tissue determine local immunity and thereby affect conditions which lead to necrosis and gangrene.⁴⁸ Good circulation has been called "the best defense of a contaminated tissue against infection."⁴⁹ A reduced blood supply not only promotes infection but also inhibits healing.⁵⁰

(6) *The Physical Condition of the Patient*

A patient's immune response to bacteria can be weakened by steroid and immunosuppressive agents. Other conditions that lower resistance to infection include diabetes, anemia, dehydration, shock, and malnutrition.⁵¹ Patients who have received radiation therapy are also infection-prone.⁵² It is therefore advisable for the physician treating a wound to obtain his patient's medical history and order a physical examination.⁵³

There is one school of medical opinion which advocates primary closure of an open *fracture* as opposed to a mere open *wound*.⁵⁴ However, more persuasive authority advocates reducing the fracture but permitting open fracture wounds to heal by secondary intention.⁵⁵

d. *Administration of Antibiotics and Anti-tetanus Drugs*

As part of the management of the open wound, a physician should exercise careful judgment as to the use of antibiotics and anti-tetanus drugs. However, use of these drugs should not be considered a substitute for proper debridement, which "is probably the most significant contribution to preventing local and systemic infection and promoting wound healing."⁵⁶ Antibiotics cannot "sterilize

47. Committee on Trauma, *supra* note 11, at 33.

48. Boswick, *supra* note 15, at 175.

49. Brown, *supra* note 1, at 45.

50. *Id.* at 49.

51. Boswick, *supra* note 15, at 174; Committee on Trauma, *supra* note 11, at 34.

52. Boswick, *supra* note 15, at 175.

53. *Id.* at 171.

54. Burkhalter, *supra* note 4, at 1445, 1457 nn. 4 & 8 (citing Carpenter, *Management of Fracture of the Shaft of the Tibia and Fibula*, 48A J. Bone and Joint Surg. 1640 (1966); Edwards, *Fracture of the Shaft of the Tibia*, 76 Acta Ortho. Scand. Supp. 9 (1965)).

55. Burkhalter, *supra* note 4, at 1445; Hampton, *supra* note 27, at 477.

56. Boswick, *supra* note 15, at 175. See also Brown, *supra* note 1, at 50.

contaminated devitalized tissue" or "neutralize proteolytic ('capable of breaking down proteins') enzymes in undrained pus."⁵⁷ In determining whether antibiotics should be used, the physician should consider the severity of the wound, the contaminating bacteria as determined by culture tests, and whether the patient's resistance has been weakened by prior treatment or drugs.⁵⁸ Administration of systemic antibiotics is indicated both before and after surgery for open fractures and open wounds in joints.⁵⁹

If a wound has been completely debrided, anaerobic conditions (conditions caused by organisms that can thrive only in the absence of oxygen) leading to tetanus and gas gangrene cannot develop.⁶⁰ Both conditions are caused by the toxins produced by clostridia (a genus of sporelike bacteria).⁶¹ Unlike gas gangrene,⁶² tetanus can be effectively prevented.

Active immunization (that in which the body of the patient produces antibodies) to tetanus is effected as a prophylactic against possible tetanus infections and ideally is effected before the patient is wounded. The immunization requires three injections of tetanus toxoid of one half milliliter each, with a four to six week interval between the first and second injections and a six to twelve month interval between the second and third. This immunization remains effective for one year; it remains effective for ten years when there is a booster of one half milliliter toxoid. For some people it remains effective, with the booster, for twenty-five years or a lifetime.⁶³

For a wounded patient who has been actively immunized but who has not received a booster within the past year, a booster is indicated. If his wound is tetanus-prone or old and neglected, both the booster and passive immunization (that effected by the injection of antibodies produced by another human or animal) should be administered.⁶⁴ A tetanus-prone wound has been described as one likely to be contaminated with manure.⁶⁵ Since the clostridium causing tetanus thrives in anaerobic conditions, puncture wounds

57. Hampton, *supra* note 27, at 477.

58. Boswick, *supra* note 15, at 175-76.

59. Hampton, *supra* note 27, at 477.

60. *Id.* at 475.

61. W. Ballinger, R. Rutherford & G. Zuidema, *The Management of Trauma* 752, 754 (2d ed. 1973)[hereinafter cited as Ballinger].

62. A gas gangrene endotoxin exists, but its effectiveness is uncertain. *Id.* at 754.

63. *Id.* at 753. *Contra*, Boswick, *supra* note 15, at 175 (the effectiveness lasts for 10 years); Hampton, *supra* note 27, at 475 (the number of years that has elapsed makes no difference as to effectiveness).

64. Boswick, *supra* note 15, at 175.

65. Hampton, *supra* note 27, at 475-76.

are particularly tetanus-prone, as they have small openings, are relatively deep, and are difficult to debride.⁶⁶

For the wounded patient who has not previously been actively immunized, active immunization should be begun at once.⁶⁷ If the wound is at all likely to be tetanus-prone, passive immunization should be administered.⁶⁸ Human immune globulin⁶⁹ (a human protein containing antibodies) is best for this process, but if it is unavailable, 4500 units of horse serum antitoxin (solution of antibody globulins from a horse) may be administered. However, the physician should weigh the hazards and likelihood of tetanus against the hazards of anaphylaxis (a reaction to the injection of foreign protein).⁷⁰

2. *Applicable Law*

Verdicts finding a physician liable for negligent wound management are relatively rare. Issues in such litigation include the standards of care exercised as to debridement, closure, and the proper administration of antibiotics and anti-tetanus drugs. The essential elements of the plaintiff's case include showing that the physician failed to meet the proper standard of care and that his negligence proximately caused the plaintiff's condition (or demise).

There are many medical considerations in any case involving questions of proper wound treatment,⁷¹ and the ultimate outcome of litigation in this area can be greatly affected by the scope and availability of expert testimony and by the degree of injury suffered by the plaintiff.

a. *Standard of Care*

The scope of expert testimony for the defendant created an issue in one case⁷² in which a majority of the Arkansas Supreme Court held that it is proper to ask an expert whether, in his opinion, the defendant's treatment of plaintiff's wound constituted malpractice.⁷³ This is generally considered to be a question for the jury, as are other questions of negligence, but the majority took the position

66. Ballinger, *supra* note 61, at 753.

67. *Id.*

68. Boswick, *supra* note 15, at 176.

69. *Id.* at 175 (250 to 1000 units, depending upon the severity of the wound); Hampton, *supra* note 27, at 476 (250 units).

70. Hampton, *supra* note 27, at 476.

71. See generally cases cited notes 72-105 *infra*.

72. McClellan v. French, 246 Ark. 728, 439 S.W.2d 813 (1969).

73. *Id.* at 733, 439 S.W.2d at 816.

that such testimony is proper where it is shown that the witness understands that malpractice relates to "standard medical procedure in the community."⁷⁴ The circumstances created a classic case in which the standards of wound management were at issue. The plaintiff was injured when he impaled his rectum and peritoneal cavity on a tree stump in a water-skiing accident. The defendant physician treated the plaintiff, failed to remove a piece of wood imbedded in the peritoneal cavity, and sutured the bleeding wound. Complications developed which necessitated a colostomy. The plaintiff's expert testified that the wound should not have been sutured but should have been packed to permit drainage. The defendant's expert claimed that it was "standard medical procedure in this community to suture a bleeding wound" and that in his opinion the treatment did not constitute malpractice.⁷⁵ A verdict for the defendant was affirmed.

Expert testimony for the plaintiff is probably essential to show a violation of the standard of care and proximate cause when the issue is a physician's negligence in wound treatment.⁷⁶ A relatively recent Arkansas case⁷⁷ held that proper wound treatment is a question requiring "scientific knowledge," and a plaintiff whose ankle was injured when a pickle jar shattered was denied recovery for the defendant's failure to discover and remove a piece of glass in the wound until her third office visit. The court upheld a directed verdict for the defendant on grounds that the plaintiff offered no expert proof.⁷⁸ A Florida case denied recovery on a similar basis when the only medical testimony (that for the defendant) showed that the treating physician had not deviated from the standard of care in the treatment of the plaintiff's wounds.⁷⁹ If the plaintiff cannot produce an expert to testify, his chances of recovering damages seem to be nonexistent. However, some courts are taking into account the "conspiracy of silence" within the medical profession and its effect

74. *Id.* Applicability of the "locality rule" was not at issue. *Id.* at n.1.

75. *Id.* at 730, 439 S.W.2d at 815.

76. No cases were found in which the plaintiff recovered without the aid of expert proof.

77. *Davis v. Kemp*, 252 Ark. 925, 481 S.W.2d 712 (1972).

78. *Id.* at 926-27, 481 S.W.2d at 713 (citing *Gray v. McDermott*, 188 Ark. 1, 64 S.W.2d 94 (1933)). *Cf. Pry v. Jones*, 253 Ark. 534, 487 S.W.2d 606 (1972) (directed verdict for the defendant was reversed and remanded on grounds that the plaintiff, whose ureter was severed by the defendant as he removed an ovary, did not need to produce her own expert).

79. *Halifax Hosp. Dist. v. Davis*, 201 So. 2d 257 (Fla. Dist. Ct. App. 1967). The issue was whether the defendant was negligent in his failure to X-ray plaintiff's leg wounds incurred when the plaintiff fell into an oyster bed while water skiing. The defendant's case was bolstered by the fact that a subsequent treating physician, not a party to the suit, had failed to X-ray the wound until the plaintiff's second visit.

on the availability of highly qualified expert witnesses.⁸⁰

The "locality rule" might be losing ground as to the standards for proper treatment of wounds.⁸¹ However, a North Carolina decision indicated in well-reasoned dicta that the locality rule should still apply in some wound treatment cases: a physician in Alaska should not be held to the same standard of care as a physician in Florida for the treatment of a rattlesnake bite, yet the physician in Alaska should be held to a higher standard of care for the treatment of frostbite.⁸² The reasoning could be applied to the treatment of a number of injuries unique to certain localities and unknown in others.

Some cases have held that there was not sufficient evidence to show that the physician violated a standard of care, although the patient would have fared better with different treatment.⁸³ In one case the experts who testified all agreed that the standard of care did not require that a piece of wire lodged in the plaintiff's leg be removed.⁸⁴ Thus, the failure of the defendant to X-ray the wound and thereby learn of the presence of the wire did not constitute negligence. In another case the plaintiff sued for a physician's failure to X-ray his foot to discover an imbedded fishbone which subsequently caused pain and infection.⁸⁵ The defense experts testified that no standard of care had been violated, for most fishbones are translucent and do not show up on X-rays. Even though the fishbone in question was ultimately discovered by an X-ray made six months after the initial injury, the defense experts explained that the fishbone had calcified inside the plaintiff's foot during the interim and for that reason showed up in the subsequent X-ray.

80. See, e.g., *Carbone v. Warburton*, 11 N.J. 418, 94 A.2d 680 (1953).

81. See, e.g., *McCay v. Mitchell*, 62 Tenn. App. 424, 463 S.W.2d 710 (1971)(plaintiff's witness from Pennsylvania was competent to testify at a Tennessee trial concerning whether plaintiff's condition was caused by infection or vascular spasm). *Accord*, *Rucker v. High Point Memorial Hosp., Inc.*, 285 N.C. 519, 206 S.E.2d 196 (1974)(court would not apply the locality rule to the treatment of a gunshot wound). *But see* *Gambill v. Stroud*, 258 Ark. 766, 531 S.W.2d 945 (1976), *rev'g on rehearing* 258 Ark. Adv. Sh. 766, 529 S.W.2d Adv. Sh. 330 (1975) (noted in 1 UALR L.J. 488). Even though *Gambill v. Stroud* did not involve questions of wound management, its holding that the locality rule applies in a medical malpractice action is probably applicable to questions of negligent wound management.

82. *Rucker v. High Point Memorial Hosp., Inc.*, 285 N.C. 519, 527-28, 206 S.E.2d 196, 201 (1974).

83. See, e.g., *Lindsey v. Michigan Mut. Liab. Co.*, 156 So. 2d 313, 316 (La. Ct. App. 1963): "Our jurisprudence does not . . . impute negligence to the physician who fails to follow that course of treatment which, at a later date, may be proved to be the wiser course."

84. *Langston v. St. Charles Hosp.*, 202 So. 2d 386 (La. Ct. App. 1967)(court not only found that the defendant had exercised proper care but also found that unusual types of bacteria, not the wire lodged in the plaintiff's leg, proximately caused the infection).

85. *Lindsey v. Michigan Mut. Liab. Co.*, 156 So. 2d 313 (La. Ct. App. 1963).

It is difficult to show that a physician who administers an anti-tetanus drug violates a standard of care when the patient later develops tetanus.⁸⁶ Even when a physician has taken no such measure, two old cases indicate that a jury could find that no duty to the patient is violated.⁸⁷

The foregoing discussion illustrates the difficulty a plaintiff's attorney might encounter in establishing that the defendant has violated the standard of care in wound treatment. If he cannot establish such a violation, there is no need to reach the proximate cause issue, no matter how much his client has suffered as a result of the defendant's treatment.

b. Proximate Cause

Once a plaintiff's attorney has established that a physician has not exercised the proper standard of care in his treatment of a wound, he must show that the negligent treatment proximately caused the plaintiff's condition. This problem is well illustrated by a Florida case in which the plaintiff's expert testified that the defendant had not exercised the proper standard of care in his treatment of an industrial wound on the plaintiff's foot.⁸⁸ However, this expert was not asked and did not testify about his opinion on whether the defendant's negligent treatment brought about the condition that required amputation of the foot; thus, a directed verdict for the defendant was upheld.

Much of the difficulty of proving proximate cause in a wound management situation stems from the fact that the physician is liable only for the injuries brought about by his negligent treatment. The physician cannot be liable for the initial wound, and it is sometimes difficult to prove that *but for* the physician's negligence, the plaintiff's condition would not exist. The Arkansas Supreme Court in *Davis v. Kemp*⁸⁹ upheld a directed verdict for the defendant on grounds that the plaintiff had failed to produce expert medical testi-

86. See, e.g., *Halifax Hosp. Dist. v. Davis*, 201 So. 2d 257 (Fla. Dist. Ct. App. 1967) (tetanus developed after a booster shot); *Williams v. Chamberlain*, 316 S.W.2d 505 (Mo. 1958) (a head wound which developed a tetanus infection).

87. *Pierce v. Paterson*, 50 Cal. App. 2d 486, 123 P.2d 544 (1942) (the jury found no negligence in failure to administer anti-toxin, but a new trial was ordered to determine defendant's negligence in failure to cleanse the infected wound); *Hodgson v. Bigelow*, 335 Pa. 497, 7 A.2d 338 (1939) (remanded for the jury to determine whether the wound was a puncture wound, as all experts testifying agreed that such a wound requires tetanus anti-toxin).

88. *Cude v. Deal*, 234 So. 2d 711 (Fla. Dist. Ct. App. 1970) (the trial judge, with the parties' permission, conducted an in chambers interrogation of plaintiff's expert to make sure that he had not testified as to proximate cause).

89. 252 Ark. 925, 481 S.W.2d 712 (1972).

mony. The court noted that an additional ground for affirmance was that the plaintiff had failed to show that any of her suffering "was directly attributable to appellee as opposed to the original injury."⁹⁰

Even when some other factor could have caused the plaintiff's condition, the court might be required to submit to the jury the question of proximate cause when there is evidence that treatment of the plaintiff's wound was substandard and could have caused the plaintiff's condition. For example, in *Zimmerman v. Safeway Stores, Inc.*,⁹¹ a medical expert testified that deficient treatment of an arm wound of plaintiff's decedent was "an aggravating factor in her demise" when she died of a stroke. The court held it was error to direct a verdict for the defendant.⁹² In *Zimmerman* there was evidence that the plaintiff's decedent had sought the defendant's services after infection had developed, that she was elderly, and that she had high blood pressure.⁹³ Medical opinion in *Zimmerman* is arguably difficult to reconcile with that in a North Carolina case in which the plaintiff's expert testified that there was no relationship between the heart attack that killed plaintiff's decedent and the acute peritonitis that developed from an unremoved bullet in the decedent's abdomen.⁹⁴

A plaintiff who can show that his treating physician failed to exercise the proper standard of care in treating a compound fracture might be successful in proving that the negligent treatment proximately caused a condition necessitating amputation. In one amazing case⁹⁵ an osteopath allegedly failed to diagnose a compound fracture, treated it as a simple one, and failed to debride the fracture wound. A verdict for the defendant was reversed and remanded because the trial court, which had submitted to the jury the question whether the defendant was negligent in failing to debride and cleanse the wound, had failed to submit also the question whether the defendant was negligent in failing to examine and diagnose the injury as a compound fracture.⁹⁶

Plaintiffs have also been successful in showing that loss of an extremity was attributable to a physician's failure to prescribe antibiotics for a compound fracture⁹⁷ and for a physician's failure to

90. *Id.* at 927, 481 S.W.2d at 713.

91. 410 F.2d 1041 (D.C. Cir. 1969).

92. *Id.* at 1042.

93. *Id.*

94. *McEachern v. Miller*, 6 N.C. App. 42, 169 S.E.2d 253 (1969)(other medical opinion was that the physician had violated no duty to the patient by failing to remove the bullet).

95. *Hollis v. Ferguson*, 244 Or. 415, 417 P.2d 989 (1966).

96. *Id.*

97. *Formont v. Kircher*, 91 Idaho 290, 420 P.2d 661 (1966).

attend the patient promptly when given notice of developing complications.⁹⁸ The latter case is extraordinary because the physician, after gas gangrene developed because of his negligent treatment, had the patient execute a release purporting to absolve the physician of all responsibility.⁹⁹

c. *A Possible Defense: The Statute of Limitations*

If the plaintiff has successfully proved violation of the standard of care and proximate cause, he may have to face the defense that his action was brought outside the statute of limitations. In a Kentucky case¹⁰⁰ the plaintiff's action was defeated by the court's application of the statute of limitations when he sued to recover damages for complications suffered from the presence in his abdomen of pieces of clothing that his treating physician had failed to remove. The court held the evidence showed that the plaintiff had notice of the presence of foreign matter within the time imposed by the statute and in the absence of a showing of fraudulent concealment by the defendant, the plaintiff's action was barred by the statute of limitations.¹⁰¹

A later decision from Idaho,¹⁰² which involved a physician's failure to remove a piece of a tree limb imbedded in the plaintiff's back ten years before suit was filed, also held that the plaintiff's action was barred by the statute of limitations when the plaintiff had notice and there was no fraudulent concealment.¹⁰³ The Idaho court made an interesting distinction between application of the "discovery rule"¹⁰⁴ when the foreign object is *not* placed in the wound by the physician or surgeon and when it is so placed (*e.g.*, when a surgical sponge or gauze is left in a surgically inflicted wound).¹⁰⁵ Even though this distinction was dictum, it is arguable

98. *Benzmiller v. Swanson*, 117 N.W.2d 281 (N.D. 1962).

99. *Id.* at 284. Apparently the release was ineffective, since the court only mentioned it in the recitation of facts and reinstated the jury verdict for the patient on procedural grounds.

100. *Philpot v. Stacy*, 371 S.W.2d 11 (Ky. 1963).

101. *Id.*

102. *Cook v. Soltman*, 96 Idaho 187, 525 P.2d 969 (1974).

103. *Id. Accord*, *Crossett Health Center v. Crosswell*, 221 Ark. 874, 256 S.W.2d 548 (1953). *See generally* 22 Ark. L. Rev. 394 (1968).

104. Under the "discovery rule," the statute of limitations runs from the time the wrong is discovered or reasonably should have been discovered. *Cook v. Soltman*, 96 Idaho 187, 190, 525 P.2d 969, 972 (1974). *Contra*, *Williams v. Edmondson*, 257 Ark. 837, 520 S.W.2d 260 (1975) (construing Ark. Stat. Ann. § 37-205 (Repl. 1962) (the statute of limitations for medical malpractice actions)). *Accord*, *Steele v. Gann*, 197 Ark. 480, 123 S.W.2d 520 (1939). *See generally* 22 Ark. L. Rev. 394 (1968).

105. *Cook v. Soltman*, 96 Idaho 187, 190, 525 P.2d 969, 972 (1974). The Arkansas Court recently refused to apply the "continuing tort" theory, which is similar to the discovery rule,

that it could be used to defeat application of the discovery rule even when the plaintiff has no notice within the statute.

3. *Legal Implications*

There are so many considerations in the management of a wound that it is difficult to predict the outcome of any lawsuit involving a question of negligent wound treatment. However, there are rather definite medical standards for proper debridement, closure, and administration of antibiotics and tetanus toxoid and anti-toxin. In any given case the physician's adherence to these standards must be considered along with other circumstances, such as the age and severity of the wound, the health of the patient, and the availability of proper medication. Also to be considered is whether, at the time the wound was treated, the patient was near death from severe shock or hemorrhage. Still another consideration is whether, as in the case of a tragic automobile accident involving many victims in a small town with only one attending physician, it was impossible for the physician to treat the patient as he would under normal conditions.

The treating physician has a duty to consider the circumstances of the infliction of the wound in determining proper treatment. The factors affecting infection and the healing process in open wounds, discussed in section 2 above, represent medical knowledge that arguably should be known to any physician. If a plaintiff's attorney can show that the treating physician neglected to consider one or more of these in treating a wounded patient, he should be able to take to the trier of fact the question whether the physician violated the proper standard of care and proximately caused the severity of infection in the patient's wound.

According to the authorities,¹⁰⁶ there are certain types of wounds in which the use of antibiotics and tetanus toxoids (and anti-toxin, in some cases) is indicated. Even though there is always the possibility that the careful judgment of the physician could be mistaken, especially when he must consider the dangers of anaphylaxis, failure to administer antibiotics and tetanus toxoid where they are indicated could result in the development of infection or tetanus¹⁰⁷ and a subsequent malpractice suit.

when a hemostat was placed in the wound by a surgeon. *Owen v. Wilson*, 260 Ark. 21, 537 S.W.2d 543 (1976).

106. See generally Ballinger, *supra* note 61; Boswick, *supra* note 15; Hampton, *supra* note 27.

107. Brown, *supra* note 1, at 45.

Medical standards for thorough debridement and proper closure of wounds not only exist but have been appreciated in varying degrees for about two centuries, as noted above. There is little conflict among the leading authorities as to what these standards are. Yet one authority has written the following concerning the medical profession's adherence to these known standards:

Ironically, these principles are really extremely simple and consist of only two major points: prompt and adequate debridement and avoidance of primary closure. Though all surgeons understand the principles of wound debridement, many do not understand the technic and, though most are exposed to it in varying degrees in their training, few have been taught the details of technic or had impressed on them that it is an exacting discipline. Compounding this lack of appreciation for the importance of debridement is the *compulsion to suture* . . . Leaving a wound open seems to create great uneasiness or even guilt in some surgeons: they seem to interpret it as a challenge not met or an incompleteness of treatment. Though most surgeons now agree that battlefield wounds should be left open, there is nevertheless a sharp tendency to dissociate such wounds from similar wounds incurred in a civilian environment.¹⁰⁸

One legal implication from the above quotation is that standard medical practice and training fall short of adequate debridement and delayed closure, and a physician or surgeon who fails to meet the standards recommended herein has not violated his duty to the patient. Such a position can be countered with the premise that a physician should not be allowed to avoid liability for negligent treatment on grounds that other members of the profession follow the same procedures.¹⁰⁹

Another implication, supported by the following quotation, is simply that the medical profession is too frequently negligent in this area because it fails to exercise procedures which are known to be most favorable: "Perhaps it is reasonable to state that an outstanding error among American surgeons is their efforts to achieve successful primary wound closure in certain open fractures when open wound drainage with delayed closure several days later would reduce the incidence of wound sepsis."¹¹⁰

Since medical standards for all aspects of wound management exist and are not widely disputed, liability for failure to adhere to

108. *Id.*

109. *Favalora v. Aetna Cas. & Sur. Co.*, 144 So. 2d 544, 550 (La. Ct. App. 1962). *Accord*, *The T. J. Hooper*, 60 F.2d 737 (2d Cir. 1932).

110. *Hampton*, *supra* note 27, at 477.

those standards is very possible. The problem of proving proximate cause is always present, however, because the patient is already injured when he seeks the services of the physician. Proximate cause might be easy to prove in the case of the patient who is not given tetanus toxoid after incurring a barnyard wound and who subsequently develops tetanus. It is more difficult to prove that failure adequately to debride a badly mangled arm proximately caused a condition requiring amputation, as the amputation might have been necessary in any event. Even though medical authorities are extremely helpful in establishing the proper standard of care in this area, they cannot be so definite on questions of proximate cause.

Conclusion

The wounded patient who wishes to recover from a physician or surgeon for negligent wound management must first prove that the treatment constituted negligence. Such proof might be difficult to effect, as expert testimony is necessary and might fail to prove a violation of the standard of care. However, there are definite medical standards for wound management, and the careful, well-prepared attorney who has an expert available should be able to establish negligent treatment if it occurred.

The second element is proof that the negligent treatment proximately caused the plaintiff's condition. Expert testimony is also required for this showing, but factors other than negligent treatment might have brought about the plaintiff's plight. Proximate cause might be the most difficult element for the plaintiff to prove and for the trier of fact to determine.

Even if he proves violation of the standard of care and proximate cause, the plaintiff might be faced with a defense of the statute of limitations or nonapplicability of the "discovery rule." Apparently this is an infrequent problem in wound management cases, however.

The medical authorities relied on for this paper not only indicate that there are rather definite standards for debridement, closure, and administration of antibiotics and anti-tetanus medications, but they also note that the medical profession frequently fails to follow accepted standards for debridement and closure. The acknowledgment of this problem has several possible legal implications, most of which favor the plaintiff in a wound treatment case.

As in any lawsuit, the outcome in a wound treatment case depends upon how the trier of fact views all the relevant circumstances. The lawyer whose client is a victim of truly negligent treat-

ment should have no trouble getting his case before the trier of fact if he has an expert to testify as to negligence and proximate cause. Prior cases indicate that his client might recover.