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Norman's War

Norman B. Kornfield, M.D., World War II Physician–Anesthetist

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NORMAN Bernard Kornfield, M.D., was a combat physician–anesthetist in World War II (fig. 1). He recorded his experiences in a homemade photography album and a ledger of cases that he subsequently donated to the Wood Library-Museum of Anesthesiology (Park Ridge, Illinois). These documents not only tell Kornfield's story and provide insight into the day-to-day life of a combat physician–anesthetist but also may be helpful in assessing the effect of World War II on the development of the medical practice of anesthesiology. It has been proposed that superior anesthetic, medical, and basic science knowledge of the physician–anesthetist led to an appreciable improvement in the quality of patient care. The surgical recognition of sophisticated anesthetic management led surgeons to seek higher quality anesthesia care, which, *inter alia*, fostered the development of physician anesthesiology.[1] The knowledge obtained from Kornfield's documents helps us to assess whether the conditions for surgical recognition of superior anesthetic management were present.

Kornfield was not a typical World War II physician–anesthetist. Most World War II physician–anesthetists had no formal training in anesthesia before joining the military. However, after completing a 2-yr rotating internship in 1941, Kornfield underwent 1 yr of anesthesia training (from 1941 to 1942) at the Jersey Medical Center (Jersey City, New Jersey) before joining the military in the summer of 1942. After World War II began, the medical center arranged for a draft deferment for Kornfield because they needed physicians.[2,3] However, Kornfield was "mad at Hitler," and, thus, to avoid interference from the local hospital and politicians, he arranged to enlist in relatively distant Newark, New Jersey.[2,3] In fact, he was so successful at avoiding scrutiny that a year later he received a letter from the Jersey City draft board asking him to reconfirm his deferment.

In May of 1942, soon to be 1st Lieutenant Kornfield received orders to report to Lawson General Hospital (Atlanta, Georgia) on July 10, 1942. He later transferred to the 33rd Station Hospital at Camp Rucker, Alabama. Kornfield does not extensively describe his experiences in the United States. The majority of his time seems to have been spent in military indoctrination and personal recreation.

England

In January of 1943, Kornfield sailed to England. He was assigned to the 2nd London General Hospital, a wartime British military hospital sited at Shenley Mental Hospital (Shenley, Hertfordshire, England), outside of London. Early in the war, American physician–anesthetists often were assigned to British hospitals. This symbiotic relationship helped the British manage their relative shortfall of anesthetists while permitting idle American physician–anesthetists to gain needed experience.[1]

The 2nd London General Hospital tended to receive the stable overflow patients from the local military hospitals. After working there for a month, Kornfield sent Colonel Ralph M. Tovell, M.D., the European Theater of Operations' Consultant in Anesthesia and the person responsible for the training of American physician–anesthetists in Great Britain, "A Critique of British Anesthesia."[4] Kornfield condemned the British practice of a "polyglot anesthetic composed of pentothal, nitrous oxide, trilene and ether" as unnecessarily complex. He claimed, "[S]pinal anesthesia would have been a much simpler and better substitute for this complex anesthetic in the vast majority of operative procedures . . . the failure to observe necessary precaution would account for the lack of success and consequent mistrust of spinal anesthesia." He acknowledged, "no remarkably great increase in incidences of complication over our own was observed. However, this, I felt, was a tribute to the resistance of vigorous young bodies, rather than a defense of the methods employed."[4] Tovell responded 4 days later to Lt. Cornfield [*sic*], writing, "I wish to thank you for your report. I think that many of the points and criticisms are well taken. I doubt if it would be good

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Fig. 1. Picture of Captain Norman Kornfield (Kornfield NB: Norman's War: World War II photography album, p 19).

policy to publish these criticisms at this time but I shall nevertheless use them warily without mentioning names in a behind the scenes attempt to improve their service."[5]

In London, in 1943, Kornfield met Dr. (later Sir) Ivan Magill, the icon of British anesthesia and a civilian consultant to the Royal Navy. Magill suggested that Kornfield visit Dr. Norman R. James of West Middlesex County Hospital (Isleworth, Middlesex, England) to learn to place posterior splanchnic and intercostal blocks for management of upper abdominal surgery. Regional anesthesia minimized the depth of ether anesthesia needed to produce adequate muscle relaxation and therefore decreased the likelihood of postoperative pneumonia.

Kornfield was initially assigned to West Middlesex for March of 1944. Because he found this assignment to be "most enjoyable and profitable," Kornfield successfully applied to stay for an additional 2 weeks (Kornfield NB: Norman's War: World War II photography album, p 21). By the time Kornfield returned to 3rd Auxiliary headquarters on April 15th, the portable surgical hospitals teams had been established, and Kornfield was relegated to a postinvasion landing. However, when a physician–anesthetist became ill, Kornfield willingly replaced him on Team No. 4, attached to a company of the 261st Medical Battalion of the 4th Division of VII Army scheduled to land on Utah Beach. Of the 3rd Auxiliary Surgical Group's 18 portable surgical teams, 12 landed on Omaha Beach, and 6 landed on Utah Beach.

Portable surgical hospital teams consisted of an operating surgeon (also hospital commander), two assistant operating surgeons, an anesthetist–internist, and enlisted technicians (usually four).[6] They were attached to clearing stations, field hospitals, and evacuation hospitals and performed "definitive surgical procedures" on patients in whom delay or transport would likely be fatal.[7] In developing these hospitals, the European Theater of Operations' consultants were influenced by similar endeavors elsewhere.[7] For example, Tovell observed that in the North African Theater of Operations, "the greatest need for thoroughly qualified anesthesiologists existed in the units situated in forward areas where the severest injuries were seen."[8] The "lack of fully experienced anesthesiologists . . . led to inexpert choice of agent and method for patients in critical conditions."[8] Thus, for the invasion, teams were established with the intent of having experienced physician–anesthetists on the front lines.[7]

On May 17th, the 3rd Auxiliary Surgical Group was confined to a common staging area. Major Robert K. Coffey, M.D., leader of Team No. 4, later wrote, "All officers and enlisted men in our area were given a complete idea of the whole invasion plan, except for the date it was expected. I never could understand why this was done so far in advance of the actual date. With so many people in possession of this vital secret, it was not possible that the enemy was not also aware of our plan. The only explanation that seems logical to me is that it was so deliberate that the enemy might think it a ruse. . ."[9] To pass the time, the men watched movies, played sports, and gambled. Kornfield claims to have won close to $1,000.

France

"Operation Overlord," the official name of the allied invasion, began on D-Day, June 6, 1944. For Kornfield and Team No. 4, the invasion began when they boarded a Landing Craft, Infantry (LCI) in the evening of June 2nd.[9] For 3 days the men stayed on the LCI, cruising the channel during the day and spending the nights in the harbor. The LCI's flat bottom did not dampen the ocean's undulations, and many men became seasick. At dusk on June 5th, the LCI finally started toward the coast of France, and by 8:30 the next morning they joined the queue of ships waiting to land. One mile off shore, they boarded a shallow draft Higgins boat and then completed the trip by wading to shore under German fire.[9]

Table 1. A Comparison of Types of Anesthetics Used between Kornfield and European Theater of Operations Data

			Combat Circumstances			
	England	Beachhead	Field Hospitals	Evacuation Hospitals	General Hospitals	All Combat Hospitals
Number of cases	155	35	239	184	152	620
Anesthesia Methods*						
General	86	100	83 (64–79)	97 (59–68)	53 (59–62)	81 (57–63)
Inhalation†	40	49	57 (41–50)	9 (8–15)	2 (6)	27 (7–10)
All pentothal‡	46	51	27 (19–34)	89 (42–62)	48 (45–61)	50 (42–57)
Pentothal	26	23	16 (15–24)	84 (36–53)	26 (31–38)	38 (31–40)
Pentothal, O_2, N_2O	20	28	11 (4–12)	5 (6–9)	22 (14–23)	12 (11–17)
Regional§	14	0	17 (21–36)	4 (32–41)	47 (38–41)	17 (37–43)
Field and local blocks	0	0	7 (13–27)	0.5 (24–31)	19 (24–29)	6 (26–31)
Spinal blocks	7	0	5 (4–6)	0 (1–3)	13 (9–11)	5 (8–9)
Sympathetic blocks‖	0	0	3 (.3–.8)	2 (.5–2)	0 (.9–3)	2 (.9–2)
Splanchnic blocks	6	0	0.4 (NA)	0.5 (NA)	0 (NA)	0.3 (NA)
Other regional blocks	1	0	2 (.7–5)	1.5 (.9–9)	13 (1–3)	4 (1–5)
Total#	± 100	± 100	± 100	± 100	± 100	± 100
Endotracheal intubation**	3	47	50 (18–36)	0.5 (2–4)	2 (1)	24 (2–4)
Perioperative mortality††	0	8.8 (NA)	14.7 (NA)	1.6 (NA)	0 (NA)	6.6 (NA)

* Kornfield data reported as percent of number of cases (European Theater of Operations data in percent). The European Theater of Operations data present the range of percentages from three time periods encompassing June 1, 1944 to May 1945. European Theater of Operations data are available for field, evacuation, and general hospitals. † For Kornfield data, the inhalation category includes all inhalational anesthetics administered except those given in combination with regional anesthesia. This category includes anesthesia induced with ether, ethyl chloride, open-drop ether, and cyclopropane (in England) alone and in combination with pentothal–oxygen–nitrous oxide or oxygen–nitrous oxide and with or without tracheal intubation. More than 99% of the combat inhalational anesthetics consisted of ether. The types of inhalational agents used in the European Theater of Operations are not available. ‡ For Kornfield data, the all pentothal category includes all cases with pentothal except those in combination with an inhaled agent or regional block. This category includes anesthesia induced with pentothal, pentothal–oxygen–nitrous oxide and pentothal–oxygen (pentothal–oxygen was used in approximately 1% of the cases). The pentothal category includes only those episodes of anesthesia in which only pentothal was given. § For Kornfield data, the regional category includes any case that lists regional as a component and includes rare cases of combined regional and general anesthesia. Primary local anesthetics were procaine and pantocaine. Adjunct general anesthesia was induced with combinations of pentothal, oxygen, nitrous oxide, and ether. ‖ For Kornfield data, sympathetic blockades include cervical sympathetic and lumbar sympathetic blocks by themselves and in combination with general anesthetic techniques. # Because of rounding, percentages may not all total 100. ** Includes orotracheal and nasotracheal intubation. †† *Perioperative mortality* is defined as death within 48 hours of anesthetic, as noted by Kornfield.

Team No. 4 landed at 10:30 and found a suitable hospital area at the crossing of two main roads around 14:00.[6,9] While waiting for their equipment to arrive, they dug foxholes, avoided strafing planes, and watched 57-yr-old "General 'Teddy' Roosevelt, Jr., cane in hand, directing a column of tanks past our crossroad."[9] General Roosevelt, son of President Theodore Roosevelt, was the only General Officer in the first wave and is known for choosing to "start the war from here," when the invasion team landed a mile south of the target.

Team No. 4 was functioning by the late afternoon.[9] They had considered several schedules, "with the idea in mind to accomplishing the maximum amount of work and the conservation of energy for a sustained effort."[9] However, they decided to work "until the back log was caught up or until fatigue overcame us" and continued through 14:00 on June 7th, at which time most of the urgent nontransportable patients had been treated.[9] Team No. 4 then established a pattern of working for 10–13 h and resting for 4–6 h. However, as Coffey wrote, "This should have been enough of a rest period, and would have been had it not been for the incessant noise which prevented sleeping during off hours. We soon got so that we were oblivious to the noises around us during the working hours but those noises seemed to be magnified during the rest period."[9]

The first patient was an English private first class with penetrating wounds of the abdomen. Kornfield used general endotracheal anesthesia with ether, nitrous oxide, and oxygen for an exploration of the abdomen (Kornfield NB: World War II Case Ledger, Operation Number 156, 6 June 1944). By the end of June 7th, Kornfield anesthetized 11 more patients for injuries including gunshot wounds to the abdomen, traumatic limb amputations, and a sucking chest wound. His last patient of the day died as the skin sutures were placed. On June 8th, Kornfield anesthetized six patients, including three German prisoners of war and an officer with shrapnel wounds to the upper abdomen and neck, who "died during induction –pt. in extremis before op. –twice postponed" (Kornfield NB: World War II Case Ledger, Operation Number 170, 8 June 1944).

Kornfield logged 35 cases in his ledger from June 6–12 (Kornfield NB: World War II Case Ledger, Operation Numbers 156–190, 6–12 June 1944; table 1). This differs from the data in Coffey's "Statistical Report of Cases Treated by Team No. 4," which suggested that 30 indi-

Fig. 2. "Typical field hospital scene." 42nd Field Hospital, 1st Platoon, Le Gast, France, August, 1944 (Kornfield NB: Norman's War: World War II photography album, p 41).

vidual cases were handled.[9]† In the report, Coffey noted, "this does not sound like a very great accomplishment in 6 days of long hours, but it must be taken into account that our team personnel actively did all of the triage and preoperative and postoperative care as well as the surgery."[9]

On June 12th, Team No. 4 worked during the day until they were sent to the 128th Evacuation Hospital, in Boutteville, Normandy, where they stayed until June 22nd. At the 128th Evacuation Hospital, regular 12-h shifts brought "a comparatively restful period, as we had none of the work of triage or shock treatment and the patients were selected and sent to us ready for operation."[9] Evacuation hospitals provided "definitive treatment for all casualties," typically had 400 or more beds, received patients directly from clearing stations, and were located in areas safe from conflict.[10]

Kornfield anesthetized 69 patients at the 128th Evacuation Hospital. Many of these cases were extremity procedures, and the majority of patients were anesthetized with pentothal. Several patients died. A German private, intubated and anesthetized with pentothal, ether, nitrous oxide, and oxygen for an exploration of the abdomen, died during closure. Kornfield wrote, "cause?? (cyanotic in spite oxygen)" (Kornfield NB: World War II Case Ledger, Operation Number 204, 14 June 1944). A 15-yr-old French civilian died 24 h after a hip debridement and placement of spica cast. Kornfield noted, "stomach full of water given pt. on ward – continually oozing into pharynx –some aspiration." On Kornfield's request, the patient's trachea was bronchoscoped, and a "small quantity of thick mucus [was removed] with great improvement" (Kornfield NB: World War II Case Ledger, Operation Number 226, 18 June 1944). A private with a traumatic amputation of the mandible and shrapnel wounds in the abdomen received local anesthesia for the oral cavity repair and intercostal and splanchnic blocks with pantocaine for the abdominal procedure. Kornfield wrote, "Entire mouth shot away –pt. in shock and bleeding into his abdomen. 1/4 Ms [morphine sulfate] IV. . . 2 amp Coramine‡ IV at low point after abdomen entered revived patient considerably. B.P. still imperceptible at close of operation. Relaxation excellent. Improved remarkably by 12 h. –fecal drainage from wound 24 h. probably uncovered hole in splenic flexure. Pt. died 36 hrs. postop" (Kornfield NB: World War II Case Ledger, Operation Number 235, 19 June 1944).

On June 23rd, Team No. 4 moved to the 42nd Field Hospital outside of Cherbourg and stayed with the 42nd through August 6th (fig. 2). Field hospitals were attached to clearing stations and cared for patients deemed unlikely to survive transport to an evacuation hospital. Kornfield's second patient on June 23rd, who had suffered a penetrating back wound, received intercostal and splanchnic blocks with procaine because "nothing else available. Some sensory anesthesia but relaxation inadequate. Exploration and closure facilitated by pentothal" (Kornfield NB. World War II Case Ledger, Operation Number 261, 23 June 1944). The next day, his first patient had a hip-to-buttock gunshot wound that required an abdominal exploration. Kornfield started with a spinal anesthetic of 150 mg procaine. The spinal anesthetic appeared to have worked to some extent because the debridement and operation began prior to the addition of other anesthetics. Thirty minutes later, Kornfield added pentothal, nitrous oxide, and oxygen to the anesthetic, and then 90 min after the spinal anesthetic was placed, Kornfield added ether. Finally, 150 min after beginning the anesthetic, Kornfield performed tracheal intubation and noted, "1000 ml bld. pumped in during op. Coramine. Pt. bad several times . . . oral intub 3 PM.

† Why this difference exists is unclear. In his summary, Coffey notes, however, "I have no record of the number of cases that passed thru our hands during this period . . . nonetheless the operating room records show that our team handled thirty cases."

‡ *Coramine* is nikethamide, a pyridithine derivative. It is a respiratory stimulant that counteracts central depressants through its effect on the chemoreceptors of the carotid bodies. In 1932, it was claimed that nikethamide was particularly valuable in overcoming morphine-induced respiratory depression.

Died after 12 hrs. Surgeon thought he had received too much blood and plasma"(Kornfield NB: World War II Case Ledger, Operation Number 262, 24 June 1944). Two days later, an infantry private was intubated and anesthetized with ether, oxygen, and nitrous oxide for an abdominal exploration: "Pt. in very poor shape at start. Became pulseless soon after start abdomen –more bld. started with no improvement. Nothing but oxygen for last hour. Pupils gradually dilated, resp. became irregular . . . pt died during closure of abdomen" (Kornfield NB: World War II Case Ledger, Operation Number 276, 26 June 1944). Despite working 16–20 h a day at Cherbourg, Kornfield completed and submitted to Army censors in Washington, D.C., the manuscript "Technique of Continuous Pentothal Anesthesia," in which he describes the syringe holder for pentothal.[11] This article was published in the August 1945 issue of the *American Journal of Surgery*.

In a summary of June 6th through July 30th, Major Coffey wrote, "probably the type of cases that have been treated surgically by the surgical teams in field hospital in forward positions has never been seen before in this war or previous wars (Russia possibly excepted)."[9] In his opinion, "practically every case we have seen would have been dead if forward surgery had not been available."[9] The members of the 261st Medical Battalion received the Distinguished Unit Badge for service from June 6 to July 18, 1944.

> Landing on the coast of Normandy, France, in close support of assault troops on D-Day, in the face of intense artillery fire, this unit, within sight of enemy forces, set up its tentage and commenced to collect and evacuate the wounded. By H plus 8 hours, clearing stations were established and major surgery was being performed. With unwavering determination, this unit handled over 75% of all casualties sustained on First Army beaches during the first 10 days of the Normandy invasion. To shoulder this tremendous burden, the officers and men of the 261st Medical Battalion worked day and night with no sleep whatever, under enemy artillery fire and air raids. Undaunted by flak which constantly pierced the operating tents, all personnel continued working in utter disregard of their personal safety in order more speedily to render medical aid to the wounded.[12]

Belgium and Germany

The allies finally broke through the Avranches bottleneck in mid-July and quickly advanced across France into Belgium, liberating Paris by August 25th and most of Belgium by mid-September. Ten days after the liberation of Paris, Kornfield toured Paris by bicycle and saw Les Champs d'Élysées, L'Arc de Triomphe, the Eiffel Tower, the Trocadero, and the Seine River. In November, Kornfield and his team had the grand opportunity to move out of "the mud of Heppenbach" and into a luxurious mansion where "it took days to get the dirt to its usual place on the ground" (Kornfield NB: Norman's War: World War II photography album, p 45). The men played chess, bridge, and gin and enjoyed a respite of "civilization" (Kornfield NB: Norman's War: World War II photography album, p 45). On November 27th, Kornfield was transferred to Team No. 18, which made him "very happy!!" (Kornfield NB: Norman's War: World War II photography album, p 46).

In December, the German army launched the Ardennes Offensive, also known as the Battle of the Bulge, by piercing the stretched allied front in an attempt to take Antwerp and stall allied supply lines. On December 16th, Kornfield and friends were returning to Waimes, Belgium, from a visit to Luxembourg City, Luxembourg, and were "nearly captured by the very first patrol breaking though" of the Ardennes Offensive (Kornfield NB: Norman's War: World War II photography album, p 47).[13] After safely returning to Waimes, Kornfield and two surgical teams were sent to the 44th Evacuation Hospital in Malmedy, Belgium, to care for casualties. Their truck passed through the main crossroads outside of Malmedy just minutes before the advancing German army took control of the intersection. In fact, they could hear the combat for the crossroads erupt behind them. They were probably the last truck to get from Waimes to Malmedy.[13] The surgical teams were quickly sent to Liege, Belgium. Kornfield's narrow escape saved him from the Malmedy Massacre, the name given to the cold-blooded murder of captured American soldiers on December 17th near Malmedy.

On December 22, 1944, in Liege, Kornfield anesthetized the German officer who was thought to have ordered the Malmedy Massacre. Fifty years later, a newspaper article recounted Kornfield's experiences:

> "When we were done, he needed blood badly." But blood supplies for Allied soldiers were scarce. "I decided to just give him saline, and he died," Kornfield said. An hour later, an American military intelligence team came to the hospital and asked to interrogate the captured German officer. Kornfield said he regretfully told the intelligence team that the patient had died only an hour before. "I could have saved him," Kornfield said. But the intelligence men told him not to regret his decision to withhold the needed blood. "You did the right thing, Doc," one of the men said. "We know everything we need to know" about the Malmedy killings.[14]

The allies drove toward Berlin, Germany, after the failed Ardennes Offensive. Towards the end of March, 1945, Kornfield went to the 100th General Hospital for 2 months of service. Kornfield writes in his album, "This was supposed to be a rest for me and a chance for Bob Smith§ the anesthetist of the 100th, to get some experience at the front, for we exchanged places. Actually, he got all the loot I should have gotten, and I worked like

§ Bob Smith was Robert M. Smith, M.D. Smith returned from the war to begin a nearly 35-yr career as Anesthesiologist-in-Chief at Children's Hospital Boston, Boston, Massachusetts. In 1959, he authored the classic text, *Anesthesia for Infants and Children*. Smith is often credited with being the father of pediatric anesthesia in the United States.

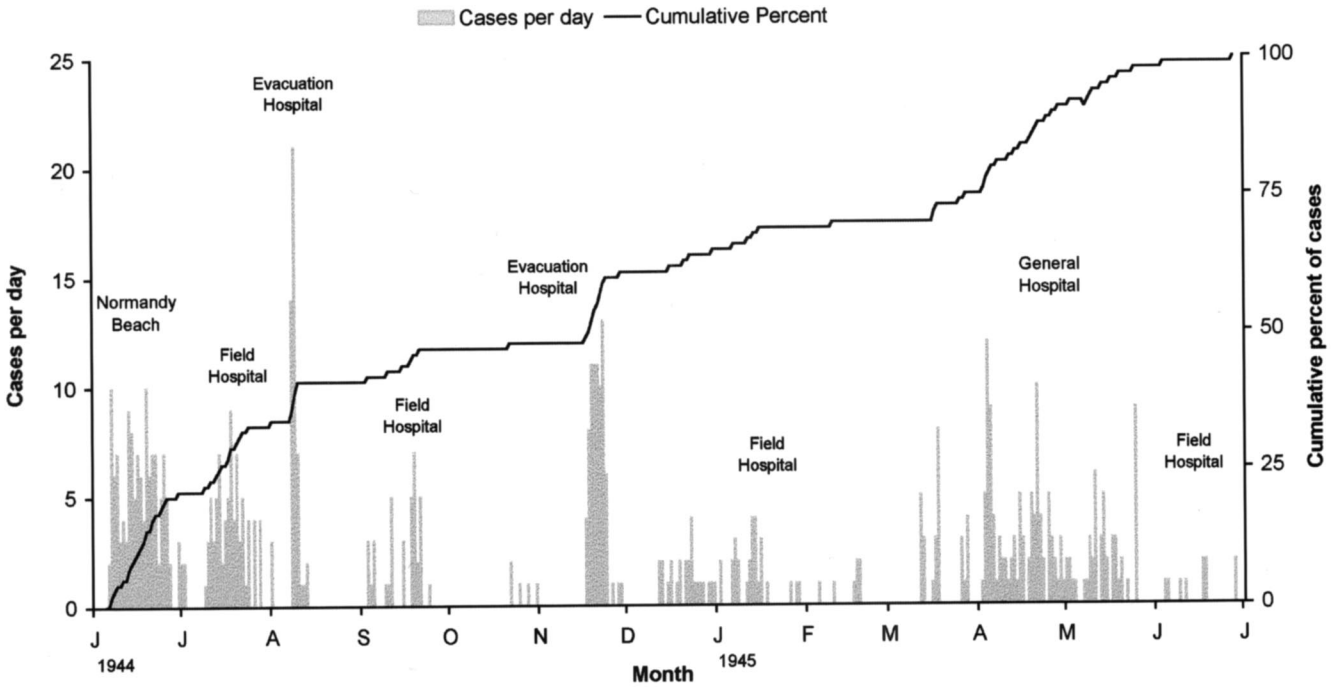

Fig. 3. Pace of cases. The left axis indicates the number of cases handled per day, and the right axis indicates a running total of the percent of overall cases handled. The months start in June of 1944 and continue through June of 1945.

hell, cause the hospital was busier than it had ever been before" (Kornfield NB: Norman's War: World War II photography album, p 57). This rotation was an official policy of the Army and was designed, as Kornfield wrote, to provide experiences at the front for those who had not been there.[15]

In June of 1945, Kornfield was sent to Rudolstadt, Germany. The schoolhouse accommodations they were given were "no way for an officer of a conquering Army to live! So I changed things . . . I requisitioned for the 4 officers of our team. Each two of us had a five room apartment. I even had the signal corps install a phone" (Kornfield NB. Norman's War: World War II photography album, p 63). The pace of the war had become leisurely. Kornfield even had time to fish daily in the nearby Schwartza River. On June 6, 1945, the 3rd Auxiliary had a 3-month overseas party, which featured a mural of their members and activities. Sometime later, they went to Giessen, Germany, where they waited to go home. By the end of the war, Kornfield had served from July of 1942 to October of 1945 and had earned five battle stars and a unit citation.

Case Information

Figure 3 shows the cases from June 6, 1944, through June 30, 1945, a total of 388 days. Clinical practice involved bursts of activity with periods of quiescence. Cases occurred in spurts of 22 consecutive days in June of 1944, 16 consecutive days in July, and 36 out of 40 days in April and May, including 15 consecutive days. Kornfield handled more than 40% of all of his cases in the first 65 days, and more than a tenth of all cases occurred during November 19–24. Both of these periods included assignments at evacuation hospitals, where it was common to perform shorter procedures on more stable patients. On the other hand, Kornfield did not perform anesthesia on more than half of the days. These days also tended to occur consecutively: 20 days in August, 27 days in September and October, 16 days in November, 12 days in December, and 20 days in February and March.

Table 1 compares the frequency of techniques used by Kornfield with the frequency of techniques used in the European Theater of Operations. Field hospitals were located near clearing stations and managed casualties who were considered to be nontransportable (fig. 4).[10] The increased use of intubation and inhalational anesthesia at field hospitals reflected the types of patients typically seen there, such as those with major abdominal and intrathoracic injuries or those who were hemodynamically unstable. Both orotracheal and blind nasotracheal intubation were used. Transportable patients were sent from the clearing station to evacuation hospitals. For the most part, evacuation hospitals saw less complex cases than field hospitals (figs. 5 and 6). The stability of these patients and the performance of a greater proportion of less extensive surgical procedures led to the increased use of field blocks and the decreased use of inhalational anesthesia. General hospitals were more formal institutions and were housed in

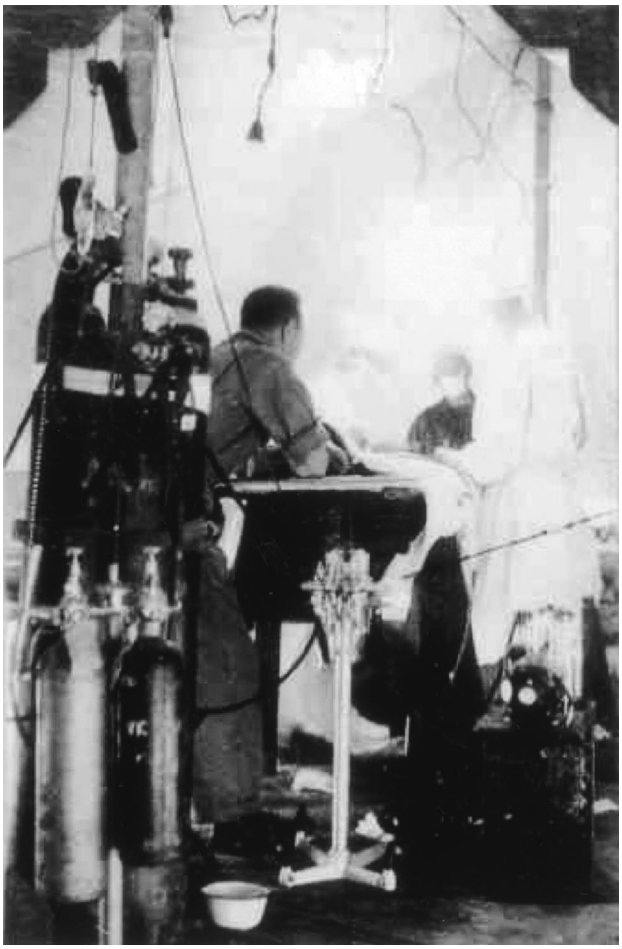

Fig. 4. "My equipment and me at work." Note portable Heidbrink machine next to Kornfield (standing) and the suction machine in the lower right corner. 42nd Field Hospital, 1st Platoon, July, 1944 (Kornfield NB: Norman's War: World War II photography album, p 39).

permanent or semipermanent locations. Befitting the relatively healthy patients in general hospitals, field blocks and regional anesthesia were used to provide anesthesia for secondary closures and nonbattle injuries.

Resources

Kornfield donated two large manuals to the Wood Library-Museum of Anesthesiology. One is a 70-page, annotated photography album of his experiences, which he titled "Norman's War." He developed and printed some pictures in the field, often in a tent with a homemade printer and using radiography fluids.[6] It appears that the scrapbook and the notes were, in some part, put together after the war, but there is no clear information about when and how it was prepared.

The other manual is a case ledger. Kornfield numbered the operations and listed the patient's rank, name, disease or injury, date of operation, description of operation, surgeon, anesthetic, anesthetist, duration in minutes of anesthetic and operation, and results. One of the interesting features of the log is that Kornfield made a point of boldly underlining the word "died." He made one obvious error. In the field in July of 1944, he incorrectly numbered the operations 314–315–316–317–315–316–317. The second operation number 315 was the same patient (but a different procedure) as operation number 314. Kornfield wrote a comment by the second operation number 315, referring to operation number 314 and noting that this was this patient's second operation. Perhaps the reference to operation number 314 prompted Kornfield to number the operation 315. Kornfield forgot about the log until 1990, when he found it serendipitously.

Analysis

Kornfield landed on Normandy Beach, toured Paris, dodged the Malmedy Massacre, and anesthetized over 600 patients in the field, in evacuation hospitals, and in general hospitals. His homemade photography album and ledger of cases "tell a story otherwise unobtainable."[6] Placing Kornfield's experiences in a larger context is problematic. He was not a typical World War II physician–anesthetist, and generalizing from one per-

Fig. 5. Running three tables in a tent at the 124th Evacuation Hospital in Percy, France, August, 1944 (Kornfield NB: Norman's War: World War II photography album, p 40).

Fig. 6. Running two tables at the 45th Evacuation Hospital in Eupen, Belgium, November, 1944 (Kornfield NB: Norman's War: World War II photography album, p 46).

son's experiences is poor historiography. However, some points may be gleaned.

In a previous work, I suggested that World War II was a critical juncture in the development of the medical practice of anesthesiology.[1] This premise was based, in part, on the proposition that the breadth and quality of care provided by physician–anesthetists improved patient care, impressed surgeons, and created a demand for their services in the postwar period. This proposition requires at least three conditions to be fulfilled. First, there must have been sufficient interaction among surgeons and physician–anesthetists for surgeons to appreciate distinctions in skill. Second, there must have been clinical opportunities for physician–anesthetists to demonstrate meaningful distinctions in skill. Third, there must have been a distinction in skill between physician–anesthetists and nonphysician–anesthetists.

Kornfield's experiences suggest that, at least in some circumstances, there were intense clinical interactions among physician–anesthetists and surgeons. Forward hospitals worked in small groups and tended to take care of many patients in short periods of time. These practice patterns suggest that opportunities did exist for surgeons to develop opinions about the clinical skills of their physician–anesthetist colleagues. Since Kornfield's intense, small-group experiences are a function of the structure of combat medical practice, it is also reasonable to suggest that these experiences are common to many forward hospitals, physician–anesthetists, and surgeons and are not a function of Kornfield as an individual anesthetist.

Kornfield's experiences also suggest that there were clinical opportunities for physician–anesthetists to show distinctions of skill. Consider how front-line care of nontransportable patients benefited from the ability to provide the specialized skill of tracheal intubation. The idea that tracheal intubation was a superior way to care for certain classes of patients provided an opportunity to show a distinction between those who had the ability and those who did not. In other examples, situations arose in which the abilities to change technique or to use regional anesthesia and analgesia affected patient care. In addition to anesthetic skills, the general scientific and clinical training of physicians may have given physician–anesthetists opportunities to show distinctions in abilities that were directly related to medical training. For example, on Normandy Beach, Kornfield was able to participate in patient triage and postoperative care. He was able to contribute to care in medical situations, such as in case 226 when he was able to recognize the need for bronchoscopy (Kornfield NB: World War II Case Ledger, Operation Number 226, 18 June 1944). Since these opportunities, whether taken or not, were a function of the patients and of the clinical situations, it is reasonable to generalize that these clinical experiences and the subsequent opportunities to show distinctions were commonly available.

The third condition is that there was a distinction in skill between physician–anesthetists and nonphysician–anesthetists. In this case, the claim of skill is solely a function of Kornfield. As such, it is inappropriate to assume that all physician–anesthetists had commensurate abilities, particularly given Kornfield's atypical prewar training.

The evidence suggests that in some situations surgeons worked closely and repetitively with specific physician–anesthetists. Practice conditions provided opportunities for surgeons to be thoroughly aware of the clinical skills of their physician–anesthetist colleagues and to discern distinctions in skill if such distinctions were present. These findings are consistent with the contention that one of the reasons that the medical practice of anesthesiology advanced after World War II was the impression physician–anesthetists made on surgeons during the war.

Conclusions

After the war, Kornfield returned to New Jersey, completed his training, and eventually received American Board of Anesthesiology Certificate Number 423. He had

several potential offers to work or head departments at Jefferson Medical School (Philadelphia, Pennsylvania), Stanford University (Stanford, California), and New York Doctors Hospital (Staten Island, New York).[6] However, he visited Lancaster, Pennsylvania, fell in love with the Amish country and the promise of nearby fishing, and moved there in 1951. He became Chief of Anesthesia at St. Joseph's Hospital (Philadelphia, Pennsylvania) and started a School of Nurse Anesthesia, which had over 300 graduates. In 1992, he was selected to be a pioneer anesthesiologist in The John W. Pender Collection of the Living History of Anesthesiology archive of the Wood Library-Museum of Anesthesiology.[2] He died in 1995 in Marco Island, Florida.

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