

Less than ten—Surgeons with amputated fingers

One hundred eighty-three surgeons who had lost parts of their hands were surveyed. Surgeons were chosen because they are highly motivated individuals, dependent on manual function for their livelihood. Loss ranged from a fingertip to an entire hand. Twenty-nine of those surveyed had lost significant parts of a thumb, and 28 had multiple-digit loss. Half had sustained their loss after becoming surgeons. The most common cause of loss was trauma. Only three claimed any significant professional disability; all others continued to practice operative surgery. Some even claimed that their loss resulted in professional advantage. Most stressed that acceptance, adaptation, and incentive were dominant factors in returning an injured or deficient hand to useful function. The conclusion from their responses is that motivation of the patient is more important to hand function than the actual number of digits.

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The idea for this study started at the 34th Annual Meeting of the American Society for Surgery of the Hand, at which Sir Sidney Sunderland was the guest speaker. During a luncheon discussion about the importance of patient motivation in adjusting to physical impairment, I noticed that Sir Sidney was missing two-thirds of his right index finger. He seemed not at all self-conscious about it, handled his tableware with elegance and efficiency and, to my query about his loss replied, "Oh, it's nothing, I can do anything with my hand."

Sir Sidney's loss (Fig. 1) and his lack of impairment suggested that finger loss in highly motivated patients whose livelihood depended on manual dexterity might not be so serious as to mandate reattachment. I selected surgeons for this study as they are highly motivated to achieve, must use their hands well, and are trained to report objectively. With the help of Hand Society members, I have identified and queried 183 surgeons with some degree of tissue loss ranging from a fingertip to an entire hand. This survey showed 122 living, 25 dead, and 36 who could not be located.

Most surgical specialties are represented. There were 79 general surgeons, 35 orthopaedists, 14 gynecologists, 9 ophthalmologists, 8 hand surgeons, 8 car-



Fig. 1. Right hand of Sir Sidney Sunderland, neurosurgeon.

diothoracic surgeons, 7 plastic surgeons, 7 neurosurgeons, 5 vascular surgeons, 5 oral, head, and neck surgeons, 2 urologists, 2 veterinary surgeons, and 2 surgeons of undefined specialty. Slightly over half acquired their amputation before becoming surgeons and the remainder subsequently. In four individuals, the amputation resulted in a change of career; three gave up surgery because of the amputation, and one person became a surgeon because of it.

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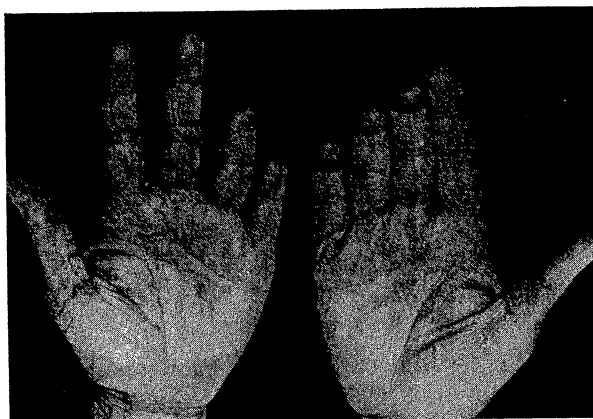


Fig. 2. Hands of general and plastic surgeon who lost parts of five fingers to frostbite on German-Russian front in 1942. Long, ring, and small fingers of each hand have restricted motion and poor vascularity. He has had to give up the piano but performs surgery without difficulty.

Table I. Level of 29 thumb amputations

	Dominant	Nondominant
Through metacarpal or metacarpophalangeal joint	13	2
Through proximal phalanx or interphalangeal joint	4	6
Through distal phalanx	3	1

Amputations

Causes. Direct mechanical trauma accounted for 94 of the amputations, unspecified trauma for 39, and congenital defect for 2. Power saws and planers accounted for 20, lawnmowers 11, gears 4, bicycle sprockets 2, ring avulsions 2, and snowblowers 2. Others included a fan belt, tractor pulley, hedge trimmer, chipper, punch press, boat hoist, car door, corn picker, and a washing machine wringer. One surgeon sustained his loss while water skiing, one from shark fishing, and one had his index finger bitten off by an orangutang. One of the two with a congenital defect was a pediatric orthopaedist with significant loss of eight digits due to congenital constricting ring syndrome.

Tumors accounted for seven of the amputations—two from radiation for carcinoma, three from post-irradiation “changes,” and one from a nail-bed carcinoma. One surgeon had a finger amputated because of an erroneous diagnosis of malignancy.

Gas gangrene, *spina ventosa* due to bovine tuberculosis, tuberculous arthrosis, gangrenous erysipelas with osteomyelitis, and an infection resulting from a human



Fig. 3. Hamilton Bailey's hands as pictured in his textbook *Physical Signs in Clinical Surgery*.

bite were reported infectious causes in 10 surgeons. Three lost their fingers to infections caused by operating on infected patients.

Frostbite caused the loss of five digits on the hands of a German surgeon at the Russian front in 1942 (Fig. 2). One surgeon lost a finger due to an electrical burn, and one hand surgeon lost parts of 5 digits on his right hand from a vascular accident, presumably embolization, following cardiac catheterization.

Eight hands were injured by gunshot or explosives, including several combat casualties, a homemade bomb, and a laboratory explosion.

Seven amputations were iatrogenic—two for recurrent Dupuytren's contracture, two for congenital deformity, two from alcohol injection into injured fingers, and one case where both small fingers were electively amputated “to improve surgical dexterity.”*

Types. There was a loss of a single digit or part of a digit in 122 of the hands, of which 29 were thumbs, and 93 were other fingers (Tables I and II). Eighty-one involved the dominant hand, and 41 were nondominant. Twenty-eight surgeons had multiple digit loss—23 involving one hand and five involving both hands. Exact data on the specific digit, the level of amputation, or which hand was involved could not be obtained in 33 surgeons; however, in these cases, a reporting surgeon was able to state that he had personally observed the surgeon and, in most cases, had seen him performing surgery.

*The old adage, “Practice makes perfect,” would seem to be more desirable than this drastic procedure.

Table II. Level of 93 single finger amputations

	Index		Middle		Ring		Small	
	Domi- nant	Nondom- inant	Domi- nant	Nondom- inant	Domi- nant	Nondom- inant	Domi- nant	Nondom- inant
Through metacarpal or metacarpophalangeal joint	12	7	8	3	5	1	4	6
Through proximal phalanx or proximal interphalangeal	7	3	4	—	1	1	1	—
Through mid phalanx or distal interphalangeal	7	4	3	1	2	—	2	—
Through distal phalanx or tip	3	3	1	2	1	1	—	—
	29	17	16	6	9	3	7	6
	46		22		12		13	

Effect on professional activities. Of the 104 amputees with whom I personally communicated, three reported a noticeable loss of surgical, manual skills. Eight admitted to "some inconvenience" and added that following their amputations, modifications were made in grasping certain instruments and in knot tying. Five had devised special instruments to compensate for missing digits, but none thought that these were essential to their surgical skills. Of those who lost fingers after completing their surgical training, only three abandoned their careers.

Of the three, two were ophthalmologists and one was a hand surgeon. One ophthalmologist lost his dominant index finger at 49 years of age and stated that he was totally disabled from performing any surgery because of the loss and persistent pain in the palm. Several large disability insurance policies specifically insured him for loss of hand function. The other ophthalmologist amputated his right hand with a power saw. The hand was reattached but has little function, and he does only an office practice. The hand surgeon lost the distal phalanx of the thumb, ring, and small fingers, as well as the distal two phalanges of the index finger, and the distal one and a half phalanges of the long finger of his dominant hand, following cardiac catheterization. This surgeon wrote that his hand was "unfunctional."

Four respondents wrote that, at first, they used special surgical gloves, but two have returned to the use of regular gloves, and they simply tuck the empty finger(s) into the palm of the glove.

An ophthalmologist who had lost the distal phalanges of the nondominant index, long, and ring fingers in a power saw accident at 39 years of age wrote, "I performed my first major intraocular surgery exactly 1 month after the accident. I have no dysfunction or disability and handle all instruments well". A general surgeon who had lost the distal phalanges of the dominant

long, ring, and small fingers and the nondominant ring and small fingers responded, "As both thumbs and index fingers are okay . . . there are no difficulties in performing surgery". A vascular surgeon missing his dominant thumb at the metacarpal phalangeal joint notes he "cannot do a one-hand tie with that hand but can handle all instruments by palming them." A general surgeon who has been without a dominant index finger since 17 years of age revealed, "I trained myself to do a one-handed tie faster than anyone else in my medical class."

Twenty-nine surgeons reported specific professional advantages to their loss. Two orthopaedists, five general surgeons, one vascular surgeon, and two obstetricians felt that the missing finger(s) and the resultant narrowing of the hand improved the hand's ability to reach into smaller spaces through shorter incisions and also improved their ability to do rectal, pelvic, and vaginal examinations. The vascular surgeon reported that the loss of his dominant thumb at the metacarpal phalangeal joint markedly facilitated his ability to palm surgical instruments without having to engage their locks. An obstetrician reported the ray amputation of his nondominant index finger was an asset because the removal of retained placentas, exploration of the uterine cavity, and manually rotation of malpositioned babies were more easily done with his narrower, nondominant hand.

Hamilton Bailey, the noted English surgeon and author of the classic text *Physical Signs in Clinical Surgery* lost his nondominant index finger at the proximal interphalangeal joint to an infection sustained in the operating room while he was a surgical registrar. He found the remaining stump such a nuisance that he eventually persuaded a colleague to amputate the finger through the index metacarpal (Fig. 3). Guy Pulvertaft told me that, "Bailey found this such a success that he



Fig. 4. Right hand of surgeon J. B. holding forceps in his three-fingered hand.

was not aware of any disability and, in fact, it was an advantage for rectal examination as the long finger, without its neighbor, had a longer reach." His left hand, minus the index finger, is pictured frequently in his famous textbook.

Eight surgeons specifically commented that their rehabilitation following the amputations and primary closure "consisted of going back to work." Four noted that they had returned to their office within a week and to the operating room within a month. None mentioned absence from the operating room for more than 3 months following their injury.

Several surgeons claimed that their digital loss was professionally advantageous as it stimulated them to become ambidextrous, thus improving their surgical skills. Two surgeons who had small fingers amputated because of recurrent Dupuytren's contracture said that their hands were more useful without their deformed fingers and that donning of surgical gloves was noticeably facilitated. One of them, an orthopaedist, added, "I wouldn't hesitate to have the adjacent ring finger amputated if contracture recurs."

Ten surgeons found their digital loss useful in reassuring patients who had had recent finger amputations and in explaining to them that finger loss need not result in disability.

Effect on nonprofessional activities. A loss in the level of playing musical instruments was most frequently mentioned in the effect that amputations had in performing nonprofessional activities. Seven of the amputees reported loss of grip strength, and five conversely noted that their digital loss inspired them to challenge the hand to acquire greater strength than it had before the amputation. A general surgeon missing a small finger said the loss caused him to abandon "what unquestionably would have been a brilliant career on

the five string banjo." Yet, another general surgeon with loss of an index finger said, "I play the five string banjo and type, and not with one finger, but the way we were taught."

Four amputees said they could not reach an octave on a keyboard and that their previous ability at the piano or organ was impaired by their finger loss. Four others with comparable loss said they had no noticeable keyboard impairment. Only one reported that he had had to give up playing the piano as he had lost parts of two fingers on one hand and three on the other. A general surgeon said that the loss of the distal phalanx of his dominant ring finger was a "blessing in disguise" because it gave him an excuse to give up a career as a concert pianist, which his parents wanted, and allowed him to choose the career he wanted in medicine. One surgeon with loss of a nondominant index finger gave up playing the violin; one gave up the clarinet, and another the flute. However, a gynecologist who had lost the dominant long and ring fingers through their proximal phalanges later learned to play the guitar but had to string it upside down to do so. He added that he had not encountered anything that he could not do. Six surgeons with index finger or small finger loss said they had some difficulty with hammers and wrenches but an equal number with similar loss denied any difficulty in controlling these tools. Five complained of dropping coins and other small objects, particularly at toll booths, or in scooping up coins. Two surgeons lacking left ring fingers complained that they could not wear wedding rings in the usual manner. Three said that they had some difficulty in buttoning the cuff of their opposite shirt sleeve. A plastic microsurgeon missing the distal segment of his dominant thumb says he has no professional difficulty but notes that pinch is difficult for very small items and "playing marbles is impossible."

A general surgeon with complete loss of the dominant thumb says, "I can do anything with my right hand except throw a football or bowling ball. I play tennis holding the racket in my right hand." This 76-year-old physician still does major surgery and states, "There is no handicap."

A 47-year-old plastic surgeon who lost one and a half phalanges from each of the dominant ring and small fingers while shark fishing notes that he has no professional dysfunction but has a slightly less efficient grip with nonsurgical tools and has had to reeducate his hand to hold his shirt or coat while dressing.

A 63-year-old general surgeon who lost the distal one and a half phalanges of his dominant index finger at age 59 admits to no professional dysfunction. He observed that within 6 months of the amputation, the long

finger had assumed all of the functions of the missing index finger. He now does everything that he did before the amputation "including hunting, fishing, skeet shooting, playing tennis, and yard work." A vascular surgeon with loss of the dominant thumb at the metacarpophalangeal joint did not feel that his work or activities of daily living were effected and stated that, "Ten million years and Darwin are proven wrong."

Other than these specific comments, all responding surgeons simply stated that they noted no functional loss or only minimal loss in performing daily activities or avocations. Some, however, noted that they had given up woodworking and others reported that they were more cautious in using power tools or machinery.

Patient reaction. Of these surgeons' patients only a few, who were mostly young children, remarked about the finger amputations. One surgeon said, "Most patients seemed to notice until I accommodated to my loss, and then no one did." The ophthalmologist who had lost the distal phalanges of his nondominant index, long and ring fingers reported that in 23 years of practice only one patient, a child of 10 years of age, noted the loss. He added, "My wife first noted the amputations after 6 months of courtship."

Many surgeons commented that the loss had caused no change in their practice and that no patient had expressed concern that the amputation(s) would compromise their treatment. Several said they were certain that they had never "lost" a patient to another surgeon because of their own loss. Some reported their patients believed them to be quite "ingenious" to operate with less than 10 fingers, and others occasionally expressed sympathy if the loss had occurred recently. One surgeon sensed that his patients with similar loss had a feeling of satisfaction "that their doctor is as dumb as they are."

An orthopaedist with loss of the distal phalanx of the right index finger passed the naval officers physical examination during World War II "and the loss was not noted." Another surgeon, lacking the distal phalanx of the long finger says, "I occasionally wave my hand in front of a patient's face and then ask if he has noticed my loss. They rarely do, and I then point out to them how obscure the loss is." Another surgeon summed up the feeling of many others when he wrote, "The less self-conscious one is, the less others notice the defect."

Surgeons' overall assessment

Many surgeons commented that attitude, adaptability, acceptance, and motivation were the important elements in their adjustment to their loss, not the degree of digital loss per se. James Becton, a hand surgeon who has lost his dominant index finger at the metacarpal

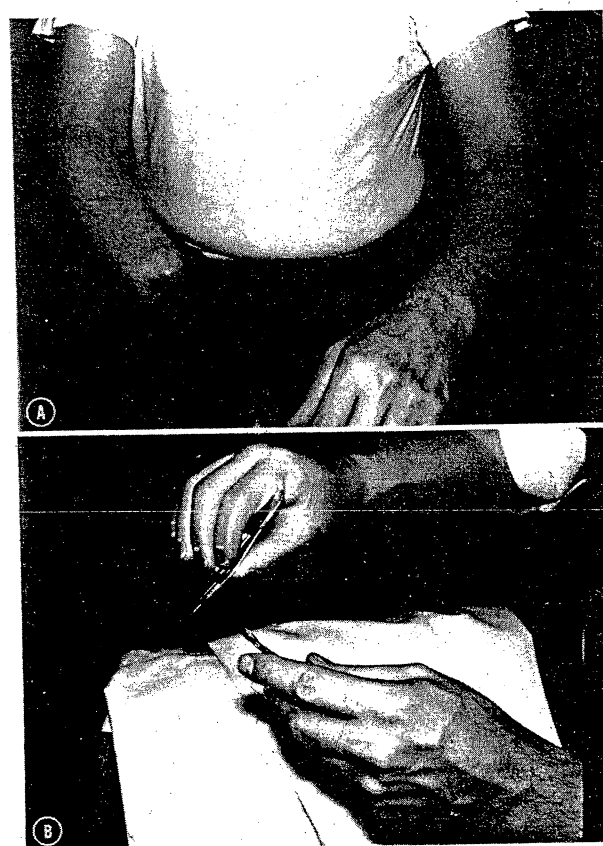


Fig. 5. A, J. T., an ophthalmologist, lost his right hand in bomb explosion at 17 years of age. B, He performs eye surgery using APRL prosthetic hand covered with rubber glove.

phalangeal joint, says, "Often a well-healed stump is functionally, psychologically, and vocationally the best thing for many patients," rather than retention of a poorly functioning digit. He says his loss causes him no dysfunction either professionally or in daily activities (Fig. 4).

Sir Sidney Sunderland, the neurosurgeon, states that, "Regarding digital loss, excluding the thumb—which has a unique and irreplaceable role in manual dexterity—the elimination, partial or complete, of any one of the remaining digits results in little impairment of function, compensation for the loss occurring more rapidly and effectively the younger the patient. In my own case, the long finger has taken over the functions of the lost index finger as well as retaining its own, and the hand has lost none of its dexterity. This makes one question the desirability of replanting single fingers. Moreover, the long-term results of digital replantation remain to be evaluated.

"The loss of two or more fingers introduces a disability factor which increases with the number of fingers lost. If the thumb and at least one finger survive,

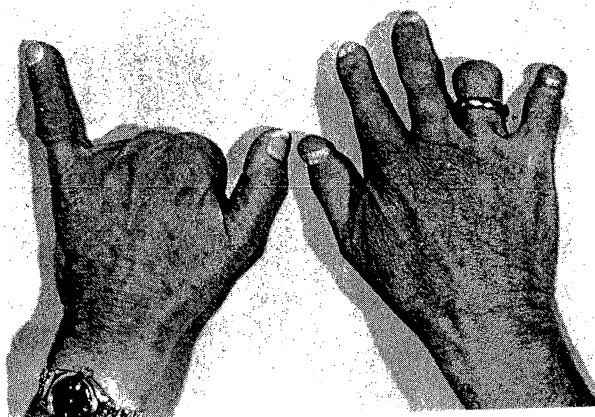


Fig. 6. L. D., a pediatric orthopaedic surgeon with congenital loss of parts of eight digits.

however, the overall hand function can still be useful. Of course, in the female, the loss of a digit always carries some cosmetic significance."

James Tucker, an ophthalmologist, lost his right hand above the wrist in a homemade bomb explosion at 17 years of age. Despite this, he successfully completed medical school and an ophthalmology residency. He has done more than 100 cataract operations per year for the past 15 years. He operates using an APRL prosthetic hand covered by a surgical glove, (Fig. 5). In his 16 years of surgical practice, he has never been threatened by malpractice litigation. He has recently been promoted to the rank of Brigadier General in the USAF Reserve, making him the first one-handed American general since the Civil War. He reports that his hand loss gives no disability in his work or in daily activities. In his words, "Handicap is a state of mind, not a state of fact."

Liebe Diamond is a pediatric orthopedist with the loss of parts of eight fingers due to congenital ring syndrome, (Fig. 6). She admits to no disability and requires no assistance in personal care or in the care of her home and family. She plays the trumpet, "as this is a three-digit instrument." She says she has no professional disability and selected pediatric orthopaedics as a career rather than general surgery or gynecology as her short fingers make knot tying difficult in a deep hole. When operating, she usually wears custom-made gloves. However, when these are not available she can manage with ordinary surgical gloves by folding the empty fingers into the glove. She has devised a special knot-tying technique and some special instruments but can, and does, use all standard orthopaedic instruments and can use scissors and scalpel with either hand. She has a large number of patients with various congenital amputations whose par-



Fig. 7. A, G. M., Jr., an orthopaedist and hand surgeon, lost his right thumb at metacarpal phalangeal joint at 16 years of age. B, He finds this type of needle holder more convenient, but not essential, in his surgery.

ents sought her care because they knew of her anomalies. She states, "The functional significance of digital loss also depends on what has been preserved. If a thumb, an opposing finger, and broad palm for gripping are left, the function will be satisfactory regardless of appearance. This presupposes a hand with intact sensibility as the prime requirement."

George Macer, Jr., has recently completed an orthopaedic residency and is now a Hand Surgery Fellow. He sustained a metacarpal phalangeal disarticulation of his dominant thumb at 16 years of age (Fig. 7). He notes no professional disability and comments, "Contrary to usual opinion, the loss of one's nondominant thumb seems more disabling than the dominant. The helping hand holds the nail or the screw, opposes the fabric or tissue in sewing, and holds tight the fragment in drilling or Kirschner wire insertion." His father, George Macer, Sr., is an obstetrician who lost the terminal phalanges of his dominant index, long, and ring fingers at 15 years of age and states that he has "hardly any functional loss in professional activities or those of daily living." He says the loss has made him completely ambidextrous. Of his son, George, Sr., write

On his evaluation as an orthopaedic resident it was stated that he was more competent as a surgeon without his thumb than the other residents who had both thumbs."

Many surgeons observed that digital loss is insignificant in properly motivated patients. Typical comments were, "Incentive is the key," and the statement made by the general surgeon who lost parts of his dominant index, long, and ring fingers at 50 years of age who said, "The important thing is what I have left and what I can do—not what I have lost and what I cannot do."

Discussion

Most of these surgeons were quite willing to describe their loss, its cause, and what effect it had had on their professional and private lives. With three exceptions they agreed that, though their loss may have inconvenienced them in some activities, it had had no major deleterious effect on their careers or their surgical proficiency. Many dealt with their loss in good humor and some even in a jocular tone. While three surgeons reported self-consciousness about the appearance of their hands, many reported that after a few months of adjustment they paid little or no attention.

Eighteen noted a specific surgical advantage, mostly relating to the ability of a narrowed hand to explore tight spaces. Two surgeons believe their amputations have favorably affected their careers—the gynecologist who stated flatly that his amputation was an asset and the general surgeon who believed that his loss caused him to be a surgeon rather than a pianist.

Surgeons with a one-digit loss reported that the particular digit, the level of the amputation, and the side (dominant or nondominant) was unimportant to their ability to adjust satisfactorily to activities. Many noted that a comfortable stump with good sensibility was easy

to accommodate to but that a tender or insensitive stump was a significant impairment to good hand function. Those reporting this experience had had revisions and shortening of unsatisfactory finger stumps or elective ray resection.

Two surgeons had reattachment of severed parts. One was a gynecologist who, at 41 years of age, sustained "an almost complete" amputation of the distal phalanx of the dominant index finger and lost the tip of the adjacent long finger. The index finger was reattached but failed to survive and was amputated at the distal interphalangeal joint 6 days later, with the stump covered with a cross-finger flap from the long finger. This surgeon states that his index finger stump has some useful sensation in it, but is a nuisance because of cold intolerance. The other surgeon is an ophthalmologist who had replantation of his nondominant hand through the proximal carpus from a chain saw at 45 years of age. The hand survived, and since then he has had many operations to improve function. He states that his hand has good circulation, gross sensibility, and limited motion (which is not very useful to him). He has returned to his office practice but does not operate. It is interesting that the 29 surgeons who had lost a thumb or part of a thumb reported little interference with their activities. One surgeon had an index finger pollicized and was disappointed with its appearance and function. Well-motivated patients adapt well to the loss of a thumb, which suggests that replantation of the amputated thumb may not be mandatory in motivated patients.

Conclusion

There are very few activities for which 10 digits are needed. The ability to adjust to an amputation injury by being successful in one's pursuits depends on patient motivation as well as the specific injury.



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