without distinction between medicine and surgery.[51] It is significant that the Greek language of the time ignored the word *cheirurgós,* "surgeon," but used the name *cheirurgía,* "hand-work," and the verb *cheirurgéin,* "to work with the hand";[52] surgery was one of the physician's techniques, not a separate way of life.

Start

Outpatient Care, Hippocratic Style

Now we shall try to step into the iatréion and see what happened there in real life. Detailed descriptions of clinical cases, complete with treatment, do not exist in the Hippocratic books. However, there are many bits of cases, sometimes even with the name of the patient: Thrinon, Billos, Dislytas. Those bits that are alike can be fitted together, and Hippocratic theory can be used to bind them. So, as an archeologist might rebuild ten acceptable amphorae out of a seabottom covered with shards, I rebuilt ten patients—and we may assume that they stand for men, women, and children who really sought help at the iatréion. In the case studies that follow, every medical fact and most words of the physician are lifted from the original text.[53]

The mood in the iatréion is set by a special hospital smell: smoke from the brazier where the cauteries are kept red-hot, fumes of boiling drugs, the aroma of herbs, resins and spices on the shelves, and a soupçon of roasted human flesh. In a corner, it looks as if a man were being pulled apart in a horrendous machine: actually he is being "treated" in the Hippocratic bench for a supposed dislocation of the hip. The iatrós and two male apprentices are working around him.

Patient No. 1: Severe Hemorrhage

Two men run in carrying a carpenter: his axe had slipped and cut his foot deeply. He is very pale and bleeds a lot. While the men lay him on a couch, the physician sees to it that the wounded leg is raised.[54] Then he dips a towel in cold water and wraps it loosely around the ankle. This will help to check the hemorrhage, because "cold water is to be applied not *to* the spot, but *around* the spot whence blood flows"[55]—a Hippocratic aphorism that stood the test of experiment in 1970.[56] Another towel is dipped in warm water and wrapped around the patient's head:[57] the idea is evidently to draw blood up there and away from the injured foot. In the meantime, an assistant has stepped outside and gone to a fig tree, where he is breaking off leaves and gathering the drops of white sap on a plug of wool.[58] The plug goes onto the wound.[59] Then—surprise—a beautiful white bandage, rolled from both ends, is soaked in red wine and applied dripping, with an adroit play of both hands.[60]

Ἰατρός

As for the juice of the fig tree: to the mind of the iatrós, it was a very good means to stop bleeding.[61] The reason was obvious to every Greek. Hear this passage from the *Iliad.*[62] The brazen Ares has been speared and immortal blood flows from his wound. Paieon spreads simples thereon, and "even as the

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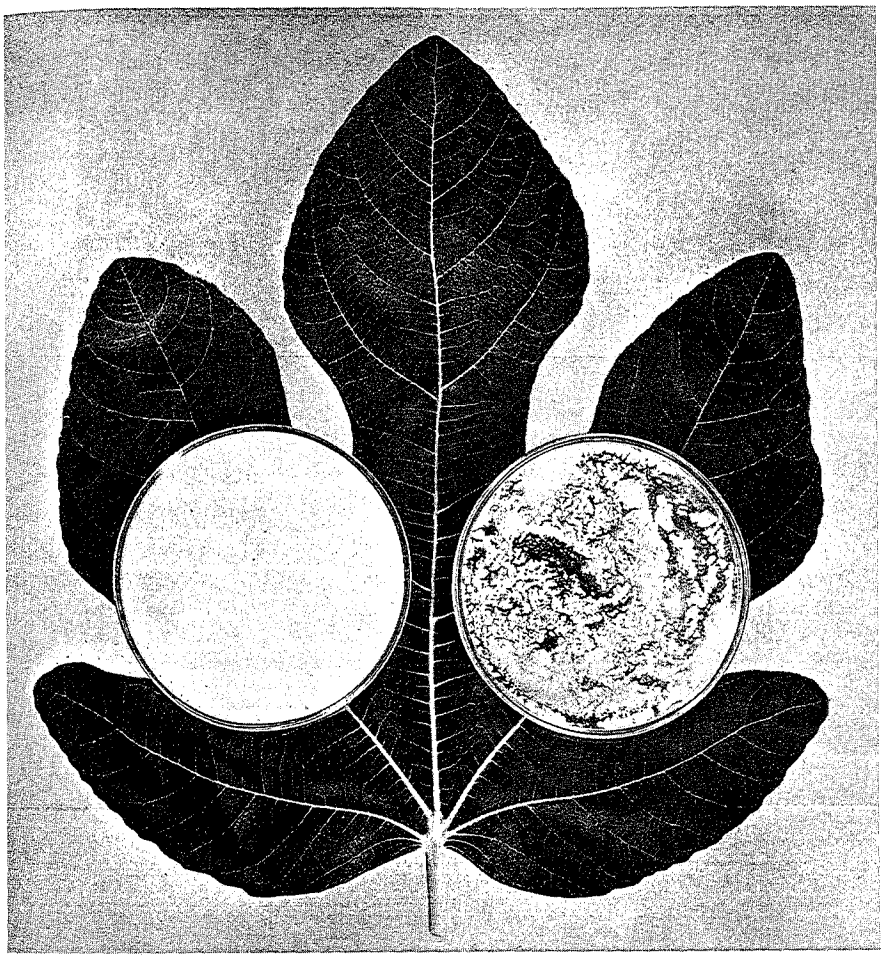
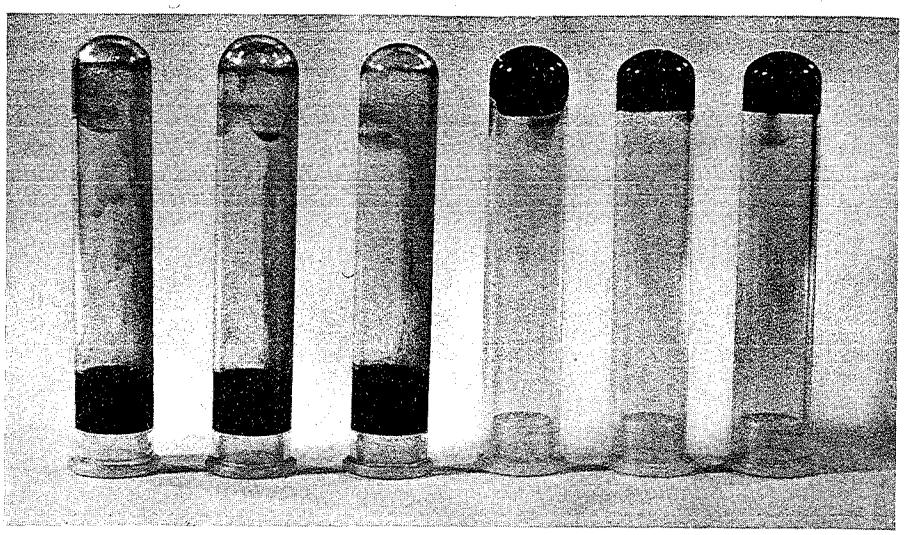


4.10 Confirming Homeric chemistry. The bottom of each of two glass dishes was covered with milk; three drops of latex from a fig tree were dropped into the dish at right; and the photograph was taken within a couple of minutes. Curdling is already obvious.

juice of the fig speedily maketh to grow thick the white milk that is liquid, but is quickly curdled as a man stirreth it, even so swiftly healed the furious Ares." Evidently Homer knew, or thought, that the sap of the fig tree caused milk to clot. From this, in Hippocratic logic, it was only a short step to conclude that what clots milk should also clot blood.

Therapy has changed so much since the *Iliad* that I found myself unable to assess either of these biological statements. So, with the help of two assistants, I scoured the Genevan countryside for a suitable fig tree and eventually procured a syringeful of latex. A drop of the latex mixed in a small dish of fresh milk made it curdle unbelievably fast (Fig. 4.10), just as Homer said. Our surprise was great. Then we went back to the literature (more of a task than doing the experiment) and found that this effect of fig-tree juice was current knowledge throughout antiquity. It is also mentioned casually in a Hippocratic treatise, which takes for granted that the reader is so familiar with the phenomenon that he can use it by analogy (as in the *Iliad*) to understand a medical theory: disease causes bodily humors to clot, just as rennet



4.11 Disproving a Hippocratic treatment for bleeding. First, six test-tubes were aligned, right side up; the three at left received two drops of fig-tree latex; and one ml of blood was added to each of the six tubes. Then three minutes later they were all turned upside down, as shown. In the "blood-only" tubes (right), clotting had occurred normally; in the others, the blood ran down, because the latex, far from speeding up the clotting, had prevented it altogether. (Until the sap is tried on a bleeding wound, however, Hippocrates still has a chance to be correct).

causes milk to curdle.[63] The word for rennet is *opós*, "the juice," and the curdling juice par excellence was that of the fig tree.[64] We had stumbled upon a fact of elementary dairy technology at least as old as Homer.

Thus far our experiment had confirmed the first part of the physician's reasoning: "Opós will clot milk; therefore, opós will clot blood." Opós did clot milk. But the second and critical step of the reasoning proved a total failure: when we added the fig-tree juice to blood, clotting was prevented altogether (Fig. 4.11). Chances are that fig-tree latex as a styptic should be written off to psychotherapy.

Back to the iatréion. The physician is planning what to do next, in case the hemorrhage should continue; and he might explain it to the carpenter in these terms: "If the milk of the fig tree will not stop the bleeding, I can apply a ligature around your leg. If you have ever been bled from the arm, you will know that a gentle tie will increase the flow of blood; and that a stronger one will stop it.[65] But I will not leave the ligature on too long, because the part of the leg below it might become gangrenous."[66] In the meantime, more cold water is poured over the ankle.

Ἰατρός

The bleeding stops; but beware. Shortly the iatrós reaches for a sharp blade, ties a band above the carpenter's knee, slits a vein in his ankle, and makes him bleed again! Quite a letdown after the brilliant beginning. This is the product of too much theory and too little anatomy. Muddled by notions that he takes for facts, the Greek practitioner has to live and work by this dilemma:

Hemorrhage kills, but bleeding helps.

So he compromises by stopping the hemorrhage and causing more bleeding. A dangerous game, especially in the hands of one who does not yet know how to tie off a spouting vessel.

Still, the iatrós had already worked out the main principle of the tourniquet, and even its built-in danger, gangrene: toward saving lives, this was a major step. Or rather, it should have been so: because this basic principle of first aid, the tourniquet, somehow failed to gain general acceptance. In the Hippocratic Collection it was clearly mentioned only once; it reappeared incidentally in the first century A.D. by the pen of a second-rate Roman writer, who ridiculed it.[67] And then it was lost. To this day, the credit for discovering the principle of the tourniquet is assigned to Ambroise Paré, who staunched bleeding in the mid-1500s "with a strong and broad fillet, like that which women usually bind up their hair withall."[68]

It is difficult to understand how a statement of this importance in the Hippocratic Collection could have been so consistently overlooked, even by modern commentators.[69] One reason may be that the tourniquet is mentioned in the context of a theoretical principle, in relation to surgical bleeding (venesection), not as a practical technique useful in first aid. Also, it appears in a book that rates fairly low in the traditional scale of excellence: category 5 in Littré's 11-point classification, under the heading "a mere collection of notes and extracts."[70] In fact, this book was never translated into English. Here is the passage, which comes after a short note on a woman suffering from quartan fever: "In case of profuse bleeding, one must find the appropriate position; in general, if [*the part*] is low, it should be brought high. In venesection, ligatures increase the flow of blood; if strong, they stop it."[71] The danger of gangrene by ligature is stated twice, but even more laconically; the clearest of the two passages reads: "Causes of gangrene of the tissues are: constriction in wounds with hemorrhage, compression in fractures of bones, and mortification from bandages."[72]

But whatever the reasons that drowned out the message in modern times, in the days of Hippocrates the tourniquet was bound to fail: the ligature of bleeding vessels was not yet known. After three or four hours, anyone who had applied a ligature faced a desperate choice: either leave it on, and cause gangrene; or remove it, and run the risk of more bleeding. The discovery had come too early.

Patient No. 2: A Round Ulcer

Ἰατρός

Next comes a plump woman, with bad varicose veins and a typical complication thereof: a stubborn ulcer on the ankle, which is bandaged. The iatrós begins by taking a pot from the burner and pouring some water, first over his own hand to check the temperature,[73] then over the woman's hand, because it is the patient who must decide whether it is comfortable.[74]

The bandages are removed while the ankle is showered with the warm water.[75] This is primarily a wash, but in the intention of the iatrós the warmth itself is essential, for two reasons. First, he believes that it will keep

the sore "relaxed," thereby preventing "spasms" (anything from chills to tetanus, as we shall see). Second, he has been taught that heat favors bleeding[76] (which is true), and he believes that this will be good for the ulcer.

As for the woman's bulging varicose veins, they will remain untouched. The books recommend puncturing them once in a while, "as circumstances may indicate," but also warn that large sores may follow:[77] perhaps a more scientific way to restate, 1200 years later, the warning of the Ebers papyrus that it is wrong to cut into "snakelike swellings."

Now the ankle is sponged with hot vinegar,[78] very carefully, because the smell of vinegar was supposed to be "harmful, especially for women"[79] (this I cannot explain). The ulcer turns out to be almost perfectly round and hollow—one of many possible shapes (a detail of no relevance today).

"For an obstinate ulcer, sweet wine and a lot of patience should be enough,"[80] says the iatrós; "but this one is round, and it will not heal unless I change its shape into a long one. I could burn it out with a caustic,[81] but it will be faster to use a knife." So this is the treatment: carving the circle into an oval. The pain is made more bearable by allowing the patient to rest after each cut.[82]

After this astonishing procedure comes the dressing: a pad of wool dipped in an *énaimon*, a "drug for fresh wounds" (usually anglicized as *enheme*):[83]

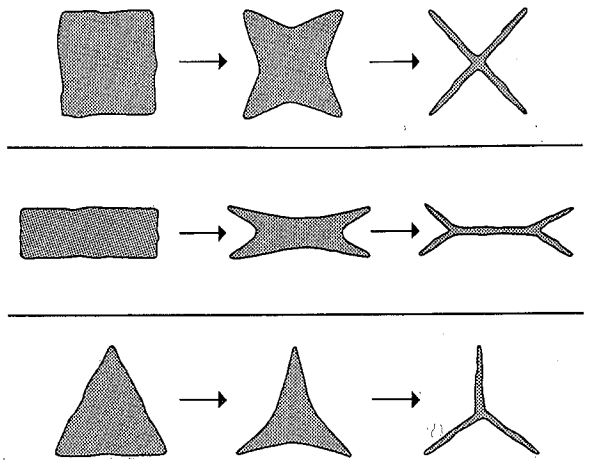
Copper acetate (*verdigris*)[84]	equal parts, dilute in wine
Copper oxide, red (*flower of copper*)[85]	
Lead oxide (*molýbdaina*)[86]	
Alum, Egyptian, roasted	
Myrrh	
Frankincense	
Gall nuts	
Vine flowers	
Grease of wool[87]	

As a wound drug, this medicated wine might be better than nothing. The four inorganic salts would probably sting but would also kill any bacteria within reach. Myrrh and frankincense would add a touch of perfume to the proceedings and join the fight against bacteria. No harm is likely to come of the vine flowers; tannin from the gall nuts may be hemostatic. The only dubious ingredient is the grease of wool, essentially a crude form of lanolin smelling strongly of sheep and probably not too clean. The Greeks loved it. Its texture, smell, and taste seem almost real in the lines of Dioscorides.[87]

The bandage over the ankle is drawn tight, probably too tight for modern standards. The purpose is to apply pressure over the swelling, so as to squeeze out dangerous blood and humors.[88]

Finally, the woman is sent home with the inevitable purge and the very appropriate warning that standing, walking,[89] or even sitting will cause her sore to heal more slowly.[90]

There is one especially bizarre procedure in this case, namely, changing



4.12 Gaping wounds heal by the inward movement of their margins, called wound contraction; hence the branching shapes of the scars.

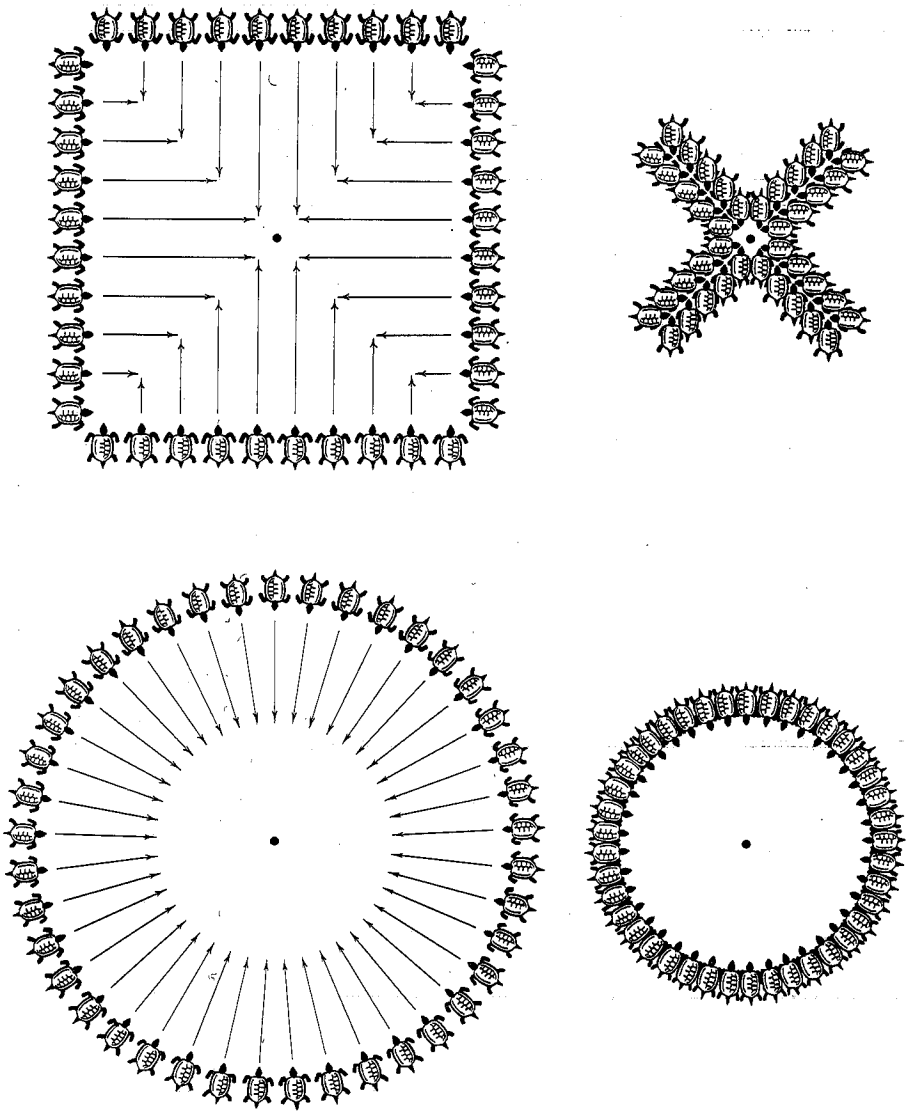
the shape of a round ulcer. It is mentioned only once in the Collection, but thereafter the bad reputation of round ulcers grew into a surgical axiom. Ambroise Paré took it for granted,[91] and Francis Adams, the learned surgeon and commentator on Hippocrates, agreed in 1849 that "circular sores are particularly difficult to heal. Every experienced surgeon must be aware of the fact, however it may be accounted for."[92] If Adams says so, we have to think twice before brushing it off.

There is indeed a fair amount of truth in the lore of the round ulcers. All gaping wounds close, to a large extent, by contraction: the raw surface becomes lined with a contractile tissue that draws the opposite margins together. Hence, square or triangular wounds heal with star-shaped scars (Fig. 4.12). As for a round wound, in theory, if it were to remain round and heal by pure contraction, it would have to reduce itself to a point: ultimately its margins would have to pile up into a vanishing space, which is not conceivable. The phenomenon is more intuitively obvious than scientifically understood; but the final result is well illustrated by the analogy with two sets of imaginary turtles. One set is laid out in a square, the other in a circle. Instruct the turtles to crawl toward the center, and see what happens (Fig. 4.13).[93]

In practice, a round wound does not heal as well as an irregularly shaped wound, unless some force is present that draws it into an oval.[94] Wounds with a surface of 30 square centimeters, produced experimentally in rabbits, took on the average 18.82 days to heal if they were triangular, 25.46 days if they were circular.[95]

The ulcers that develop in legs with varicose veins are difficult to heal (round or not), because their blood supply is bad. Long-standing ulcers also develop thick, firm, fibrous edges that resist the centripetal pull. Hence, the ancient practice of carving them out was dangerous—indeed heroic—but not entirely irrational.

If patient no. 2 heeded the advice not to walk after the surgery (she probably had little choice) this alone should have helped her ulcer. Her dressing was antiseptic. Perhaps she gained something at the iatréion.



4.13 Using turtles to understand the rules of wound contraction. A formation of crawling turtles laid out in a square (above) shows how the inward motion of the margins leads to an X. A circular formation of turtles (below) can never close: this resembles the behavior of round wounds, which cannot heal except by changing shape.

Patient No. 3: Pus in the Chest

Ἰατρός

This feverish young man is directed to sit on a stool, facing away from the light.[96] On the back of his chest, rather low, there appears a broad, soft lump. To the iatrós the correct diagnosis is obvious: there is so much pus in the pleural cavity (empyema) that it is ready to come out through the skin. Empyema so far advanced as to bulge under the skin is rare nowadays, but it was common in antiquity. Celsus recorded that "it is common for fistulae to have their exit between ribs."[97]

To confirm his diagnosis, the iatrós seizes the patient by the shoulders, shakes him, and listens closely,[98] expecting to hear "a wave and a noise . . .

like [*shaking*] a skinsack."[99] But this time there is no noise at all. This he takes to be a bad sign.[100] Pus is definitely there, since it is ready to come through the skin, so it must be "too thick, or too abundant," to splash around in the pleura.[101]

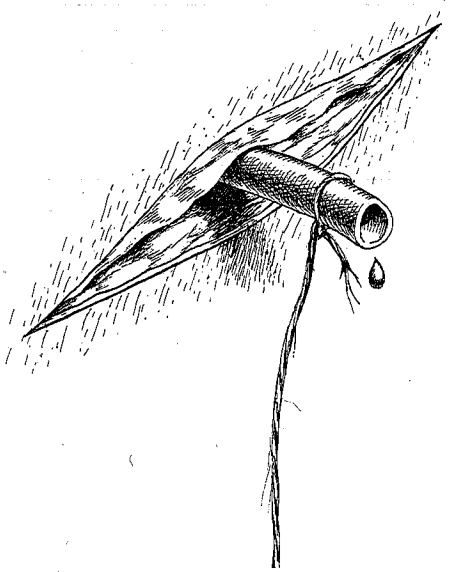
In any event, the correct conclusion is that pus must be removed from the chest, and this calls for surgery. Although the painful spot indicates where to incise, the iatrós prefers to double-check. He and his aide dip their hands into a jar full of wet potter's clay and quickly smear it all over the back of the patient. Then they watch attentively. The first patch to dry up will indicate the hottest point of the skin and therefore the best place for cutting.[102] The back of the patient is now washed with a lot of hot water, and the operation is performed. The style of the text suggests that this was routine surgery:[103]

> Cut as low as possible so that the pus may flow out more easily. Cut between the ribs, the skin first, using a knife with a rounded blade. Then take a pointed knife, wrap its blade in a cloth so that only the point will protrude as much as the length of a thumb's nail, and cut through [*to the pleural cavity*]. Let out as much pus as you think best, then put in a tent[104] of raw linen attached to a thread [*presumably to retrieve the strip of linen, should it slip beyond reach*]. Let out the pus once a day. On the tenth day, having removed all the pus, put in a tent of fine linen; then inject warm wine and oil through a small tube, so that the lung, accustomed to be moistened by the pus, may not remain suddenly dry. Remove in the evening the oil and wine injected in the morning; that injected in the evening, remove it on the following morning. When the pus becomes as thin as water, slippery to the finger, and scanty, put into the wound a hollow tin drain. When the pleural cavity becomes dry [*i.e. ceases to produce fluid*] cut the drain shorter little by little, and allow the incision to heal as you retrieve the drain.[104] Signs that the patient will escape death: if the pus is white and pure and contains streaks of blood, there are good chances of healing. But if pus . . . on the next day flows thick, greenish and fetid the patients die after the pus has run out.

Oil was still being injected into the pleural cavity some years ago in the treatment of lung tuberculosis;[105] drainage with a rigid tube is an important world première (Fig. 4.14). The overall procedure is quite advanced. But once again, postoperative treatment is just about disastrous. To stop the formation of pus the patient is bled from the arm, purged, and given a starvation diet: thin barley gruel and dilute *oxymel*, a mixture of water with a little honey and vinegar.[106]

Obviously, some of these patients came out alive. Daring as the operation may seem, it was probably suggested by the natural course of events (that is, the spontaneous exit of the pus) and by familiarity with holes in the chest due to stabbing with "spears, daggers and arrows."[107] Survival from such wounds was not unusual.

The patients were operated while sitting "on a firm stool"[108] (the firmness of the patient being taken for granted). Afterwards, they probably went home. It has often been claimed that the iatréion had facilities for inpatients. I checked the evidence and found it to be unbearably thin: one court



4.14 Surgical drainage of pus with a piece of tin pipe—another Greek practice that sank into oblivion.

case in which the defendant, a citizen of peculiar habits, was accused of sleeping at the iatréion *with the physician!*[109]

Not enough to make a ward.

Patient No. 4: A Fallen Lung

This young woman has been operated on for empyema several weeks before. The wound has begun to close, but now she complains of what she calls pleuritis. Doctors tend to be irritated by patients who offer their own diagnoses, but the young woman is not doing that. *Pleurón* meant "side," and *pleuritis* was vaguely "the thing of the side."[110] The ending *-itis* was still far from taking the turn it took with appendicitis, where it now means "inflamed." Athena Ophthalmitis had no red eyes; she was just the goddess "with the [big] eyes." Hepatitis was not a disease, but a vein connected with the liver, and steatitis was "the thing like fat," a stone.[111]

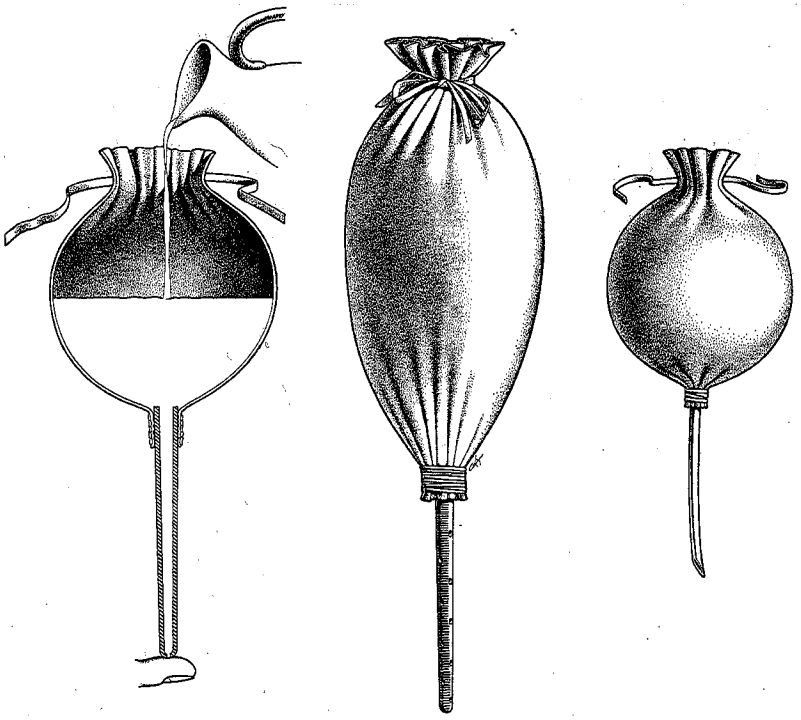
So the iatrós directs the young woman to sit on a stool, kneels behind her, lifts her chitón, and applies an ear to her back. Yes, auscultation! His gesture was just like ours (Fig. 4.15).

Ἰατρός

He hears an abnormal sound, "a creaking sound like leather."[112] Today we know what this means: the surface of the lung, roughened by infection and inflammation, is rubbing against the rib cage. As the iatrós sees it, the lung "has fallen against the side,"[113] and he has an answer to the problem. On a shelf are stored several pieces of tubes and dried animal bladders of various sizes, his disassembled syringes (Fig. 4.16). He attaches a bladder to a small tube and inflates it.[114] Then he slips the free end of the tube into the wound, pushes it into the pleural cavity, and blows in the air. Finally he withdraws the tube and plugs the passage with a solid rod of tin. He thus obtains an ar-

4.15 A iatrós l

4.15 A iatrós listening for lung noises, of which he understood at least two.



4.16 Greek syringes: an animal bladder tied to a pipe was filled with fluid or air. The largest pipe (left) was for enemas; the finest, a feather shaft (right), was for the urinary ways. The middle one, made of silver, was for gynecological use. About one-third actual size.

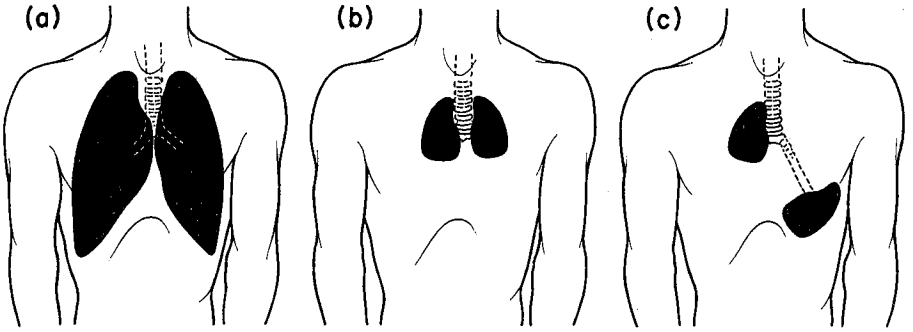
tificial pneumothorax—a nineteenth century invention! But why did *he* do it?

To solve the mystery we will have to analyze that phrase "fallen lung," which seems to make no sense at all. Commentators have either ignored it or found it bizarre.[115] Having first repressed all modern knowledge of anatomy, we will step into the sandals of a iatrós who is trying to learn something about the lung, perhaps by standing next to a butcher as he opens the chest of a slaughtered animal.[116] As the knife plunges into the rib cage, there is a faint wheeze: normally, the lungs are in contact with the inner surface of the chest, being held there by the negative pressure in the pleural cavity (Fig. 4.17a). The instant that a blade reaches the pleura, air is sucked in, and the lungs—while they are still out of sight—recoil inward and upward to their point of attachment (Fig. 4.17b). This is the position in which the Hippocratic physician finally sees them, and he necessarily takes it to be normal. If the normal lungs are perched high up in the chest, in order to come and rub against the lower rib, they obviously have to fall (Fig. 4.17c).

Ἰατρός

Now the purpose of the operation becomes clear: it was a matter of blowing back into place a lung that had fallen down, just like air blown into the vagina was used to straighten out a "displaced uterus,"[117] or the wind of the blacksmith's bellows to pop an intestinal obstruction.[118]

As a result of the operation, the creaking noise has disappeared. For the pain in the side, a beef bladder or skin bag full of hot water will help. But the young woman is no better off. The pain in the side is still there, because the iatrós has given her an acute pneumothorax (air in the chest)—luckily not



4.17 The Greek misconception of a "fallen lung": when a physician heard the lung rubbing against the chest wall, he thought it had dropped against it.

severe, but enough to cause discomfort, to speed up the heart rate, and to make breathing difficult. And her pleural infection has been increased. She would have been well advised, I fear, not to seek help.

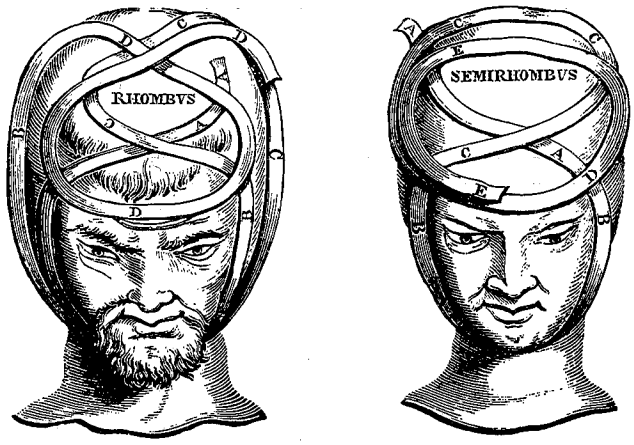
Patient No. 5: A Cut in the Face

A youngster comes in accompanied by a slave. He has a clean slash on the nose, where a playmate hit him with an *óstrakon*, a piece of broken pot.[119] The wound is washed with a generous shower of white wine,[120] then patted with a sponge and pieces of clean, dry linen.[121]

"This is a sharp cut," says the iatrós. "Had there been any bruised flesh, I would have helped the wound to produce pus, for pus makes the bruised flesh melt away.[122] Since there is no bruise, I can make the wound close fast, without the formation of pus." He takes a bronze needle, threads it, stitches the flesh, and covers the suture with a mixture of copper oxide and honey.[123] The dressing is a double pad of cloth soaked in wine, then a slice of clean sponge, rather dry, and a handful of leaves.[124] The sponge under the bandage is to apply pressure. The leaves have not been understood,[125] but I assume they served the purpose of today's gutta-percha or plastic sheet, namely, to prevent rapid evaporation from the dressing. The bandage is an artful *semi-rhómbos* (Fig. 4.18),[126] its end being sewn in place with thread and needle.[127]

Greek physicians took great pride in sending away their patients with tricky and aesthetic bandages. The Hippocratic Collection has much to say on the art of bandaging, but also warns that some turn it into "a foolish parade of manual skill,"[128] and that a stupendous bandage is not equivalent to excellent medicine.[129] "Leave aside theatrical bandages that serve no purpose; this is miserable and fit for charlatans, and often hurts the patient. Indeed the patient is seeking not ornaments, but help."[130]

To a modern patient, the end of the bandage ritual brings a sigh of relief. But a Greek patient still had lots of trouble ahead. The physician might caution the child: "Now that your wound is sutured, we must prevent it from throwing pus, or it will open again. We will have to purify the body from below (*hypocatharsis*).[131] So drink this potion." The scrolls at the iatréion list over sixty drugs claimed to be cathartics (*catharsis* meant "puri-



4.18 Rhómbos and semirhómbos bandages. Bandaging the head was an art; Galen's book *On Bandages,* based on Hippocrates, has at least seventy varieties. To apply these bandages, follow the letters.

fication"), and some are indeed very powerful.[132] Then, turning to the slave, the iatrós says, "See to it that he drinks hydromel, seven parts water to one part honey,[133] but allow very little food and absolutely no cheese until I tell you." The Greeks made a great fuss about the dangers of cheese. They were probably alarmed by the resemblance between cheese, mainly coagulated protein, and the whitish fibrin that coagulates in sores—which they called *phlegm:* "cheese is phlegmatic."[134] Finally, the patient is instructed to come back "the day after tomorrow," for it was standard practice to change the dressings every other day.[135]

These sutures, with their Indian counterparts, are the first definite examples after the Egyptian *ydr.* In view of the tendency of nonaseptic sutures to become infected and drop off, it is not surprising to find that stitches in the flesh are mentioned only three times in the Collection,[136] and then only in relation to the nose and the eyelids. Modern surgeons are well aware that wounds about the face heal "more kindly," with less risk of infection.[137] Perhaps the iatrói, too, had discovered that wounds in the face stood a better chance of tolerating sutures.

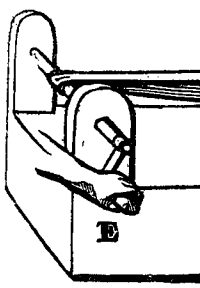
So far so good—except for the purge and the diet. If infection does not cause the suture to break down (young people are good patients in this respect), the iatrós will have performed a useful function.

Ἰατρός

Patient No. 6: Recurrent Dislocation of the Shoulder

The next patient is a sleek *éphebos* still oily from his last wrestling match in the gymnasium (Fig. 4.19). He is clutching his left arm, obviously dislocated at the shoulder; the pain is not great, and it is the fourth time it has happened anyway. The treatment is routine to him. In principle, all dislocations were supposed to be treated on the contraption that is now called the Hippocratic bench or *scamnum,* basically a device for stretching the patient with winches (Fig. 4.20).[138] But a humerus that kept slipping out of its sockets

4.19 A Greek
The emphasis
related to the



4.20 The Hippocrat
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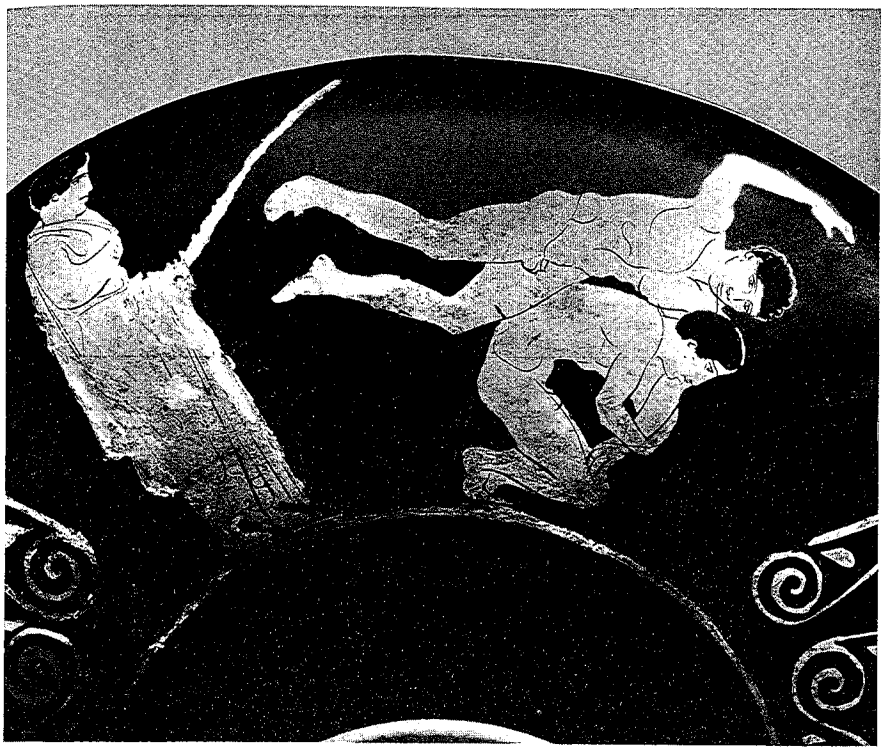
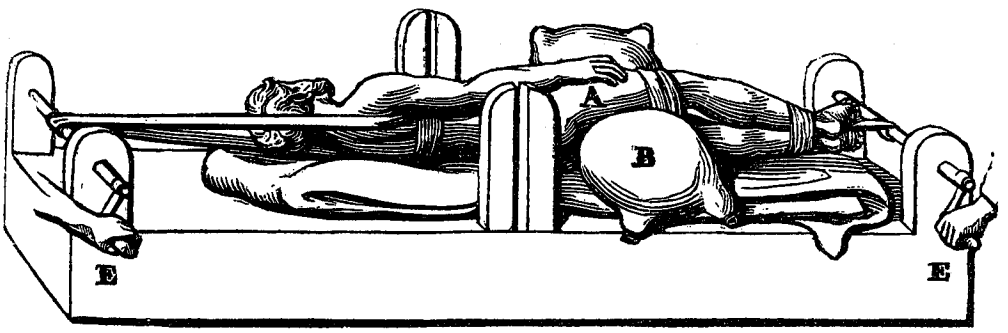
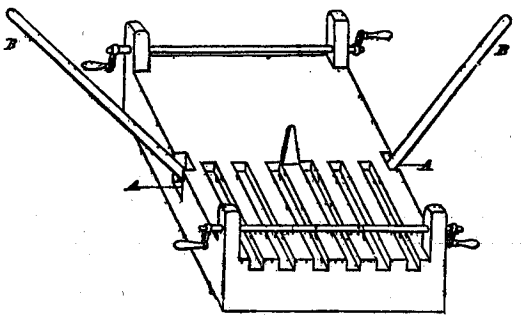
supposed to have be
inflated skin bag (B)
the limb is submitte
counter-traction. N
the screw had not y
a very dangerous ma
helped only rarely,
interpretation of th
lateral levers (AB), t
central pin (*priapisi*

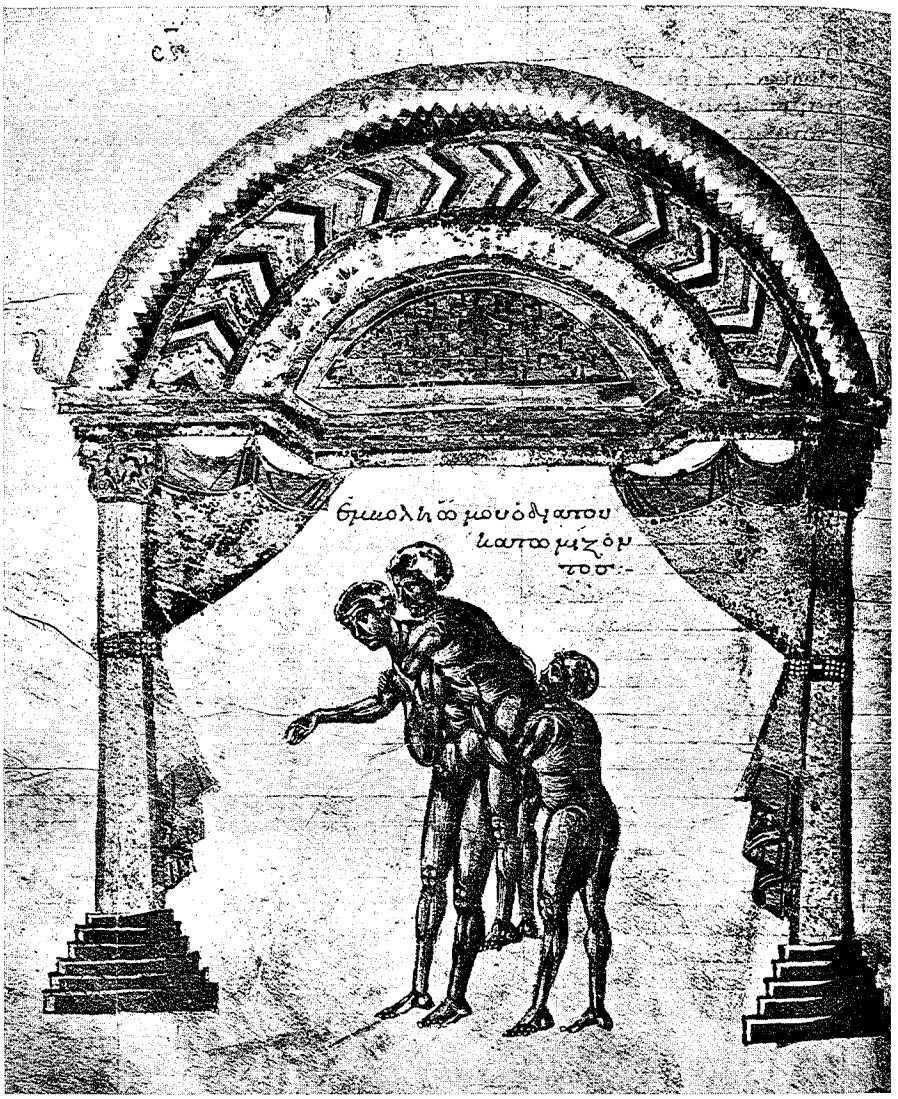


4.19 A Greek throw, the *se-oi-nage* of modern Judo, which will cause a heavy fall. The emphasis on dislocation of the shoulder in the Hippocratic books was certainly related to the popularity of wrestling.



4.20 The Hippocratic bench at work (above). Here the upper end of the femur (A) is supposed to have been luxated inward, so the inflated skin bag (B) eases it outward, while the limb is submitted to traction and counter-traction. Note the crankshafts (E); the screw had not yet been invented. This is a very dangerous machine, which could have helped only rarely, if ever. In a later interpretation of the bench (right), with two lateral levers (AB), the patient lay astride the central pin (*priapískos*).



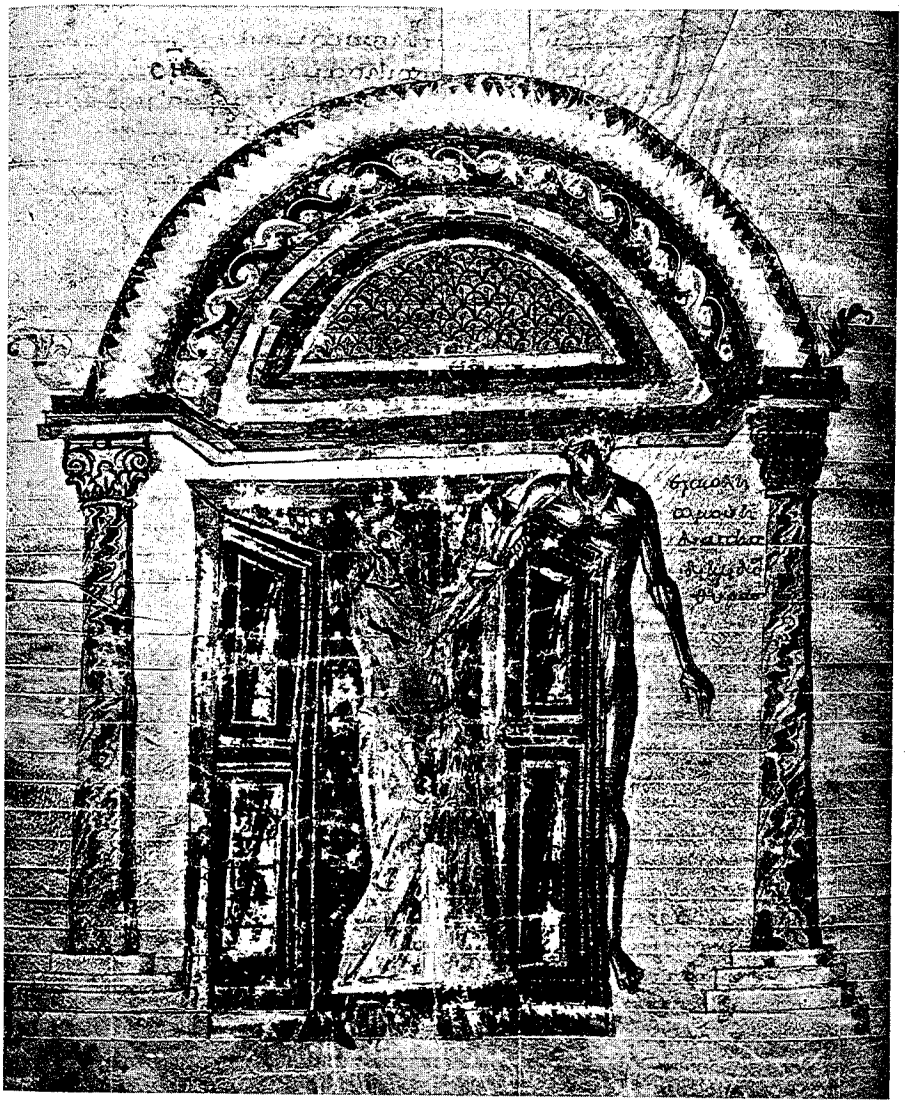


4.21 One of nine ways to reset a dislocated humerus. The physician, if tall enough, pulls the patient's arm over his shoulder. This method was "very convenient at the wrestling school." From a Byzantine manuscript of the Hippocratic book *On Joints*, c.950 A.D.

could be reset by simpler means. Thus, the éphebos lies down on the bare floor; the physician sits down beside him, puts a little ball of sewn leather in the patient's armpit, and tugs at the arm while pushing the ball with his heel—a technique still recommended.[139]

Ἰατρός

The main problem is solved once again; and if the maneuver had failed, the iatrós had eight other ways to go about it, like pulling the patient's arm over a door or over a chair (Figs. 4.21–4.22). This time, however, the young man is served a sermon. His humerus has been slipping out too often. What if someday it slips out during a real battle? It has happened to others, and that was their last time.[140] Since the joint is too loose, the remedy will be to poke a cautery through the skin of the armpit (Fig. 4.23). This will cause the tissues to retract and keep the bone in its place.[141] Gritting his teeth, the éphebos accepts the new challenge.

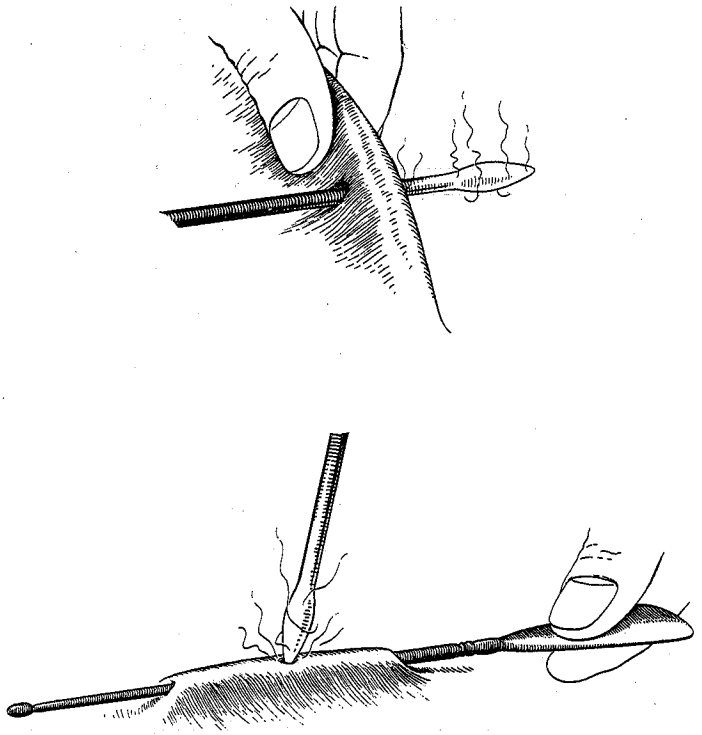


4.22 Another method to reset a dislocated humerus—over a door. From the same manuscript.

Before decrying the iatrós for suggesting this dreadful procedure, consider his grasp of matters surgical. He knows, in fact he applies the phenomenon of wound contraction, which is so powerful in burn wounds ("in this way the cavity, into which the humerus is mostly displaced, is best scarred over and cut off"). He also knows the basic surgical anatomy of the axilla and devises the operation accordingly, for the text mentions the "glands that everyone has in the armpit" and even the neurovascular bundle. Here is the physician's warning to the patient, transcribed almost literally: "I will heat the cautery until it glows white: that way it will be faster in going through the fold of skin; but be sure not to move, for deep down there are some nerves and a large vein, and at all cost they must not be touched."

Ἰατρός

The operation, extremely painful, leaves three black sores. Each one is covered with a lump of greasy wool. The iatrós is again worried that they



4.23 Triple cauterization of the armpit in cases of recurring luxation of the shoulder. The contracted scar left by the burns was supposed to hold the bone in place.

might catch cold, especially since they are burn wounds.[142] This obsession with cold may be connected with the specific choice of unwashed wool for the wounds. A seventeenth century Italian commentator refused to believe that the Divine Master himself could have recommended such filth,[143] but after all, if warmth is the purpose, greasy wool is warmer.

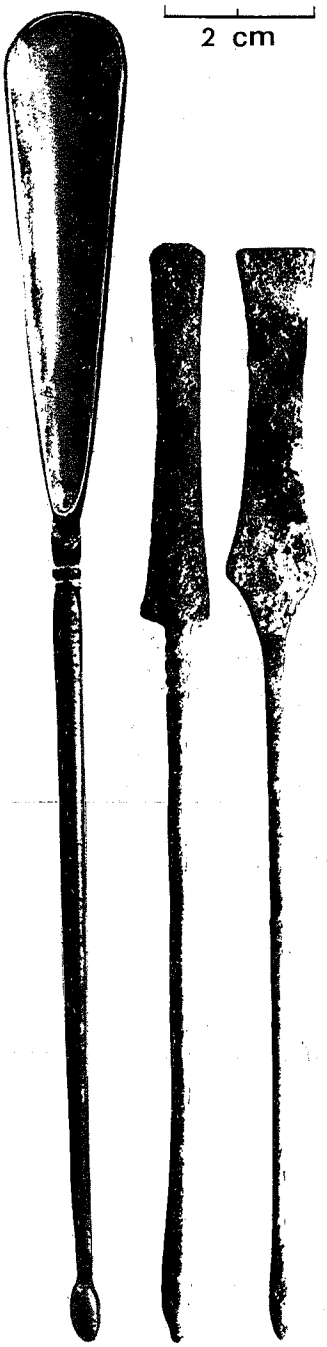
My guess is that in the long run the operation worked—by keeping the patient away from the palaestra, and maybe from the battlefield as well.

Patient No. 7: Carpentry on the Skull

Ἰατρός

This boy aged eleven is mentioned in the fifth book of the *Epidemics*. While grooming a horse, he received a kick in the forehead.[144] The iatrós explores the wound with a probe (Fig. 4.24)[145]—no fingers—trying to determine whether there is a fracture or maybe only a shallow dent left by the horse's hoof (Fig. 4.25). He calls such a dent by the name of *hedra*, literally "chair" or "seat." The Greeks were so concerned with the fate of bruised bone that they developed this special name for dents in the skull unaccompanied by fracture. It is one of the few Greek medical terms that died out, because the underlying concern has also disappeared: bruised bones heal perfectly well if left untouched and sterile (hedrae still happen, but they are absorbed into the general notion of contusion).

To the iatrós, this preliminary probing is essential. If there *is* a fracture, he will *not* operate further; if there is no fracture, he will drill a hole in the



4.24 Multipurpose probes, with which Greek physicians touched and treated wounds, rather than using their fingers, as had their Egyptian predecessors. Whether probes were better or worse than fingers depends on how clean they were kept.

4.25 Dents or notches in the skull, without fracture, caused by blows. The Greeks called them *hédrae,* and worried physicians scraped them away. How wrong they were is shown by the skull of this miserable prehistoric Peruvian, who had about seventeen hedrae (from sling-stones?), all presumably unscraped, and all healed.

skull; and if there is just a hedra, he will scrape it away. Here he runs into a diagnostic problem: how is he going to distinguish a thin crack from a normal joint between two bones?

The answer is a hair-raising bit of carpentry *in vivo.*[146] First he shaves the head.[147] Then he enlarges the wound, lifts the scalp all around it, and packs the space with lint. Then he plugs the wound itself with a plaster made by boiling vinegar and barley flour, and covers the whole with a bandage. That is all for the day. The next day he removes everything, smears the skull with something that looks like black shoe polish;[148] and covers it again with oil, linen, and more barley plaster. The third day he scrapes the blackened skull with a sharp knife: experience has shown him that the black will come off everywhere except from cracks and dents (Fig. 4.26). He goes on scraping until all the black is gone. To the Hippocratics this horrible procedure was very important. Perhaps they thought that bruised bone would decay and slough off, as soft tissues do, and therefore preferred to scrape it out from the start.

Ἰατρός

The most perplexing part of the story is that if the iatrós had found no fracture or hedra at all, he would have felt compelled to drill a hole with one of the several gadgets at his disposal (Fig. 4.27). In essence, *if you find no hole, make one.* Rivers of ink have flowed over this riddle. But again, it made good sense in the context. To the mind of the Greek physician, a blow must cause blood to spill beneath the skull or humors to accumulate there; all this material has to be given a way out before it turns into pus. If there is a way out already, such as a fracture, fine; but if not, it will be necessary, as Francis Adams put it, to "slacken the tightness of the skull."[149]

Drill slowly, recommends the text, because the bone may heat up and burn.[150] The unknown writer was well acquainted with this problem, because similar hand-drills were used to start fires,[151] much as in ancient Egypt.

4.26 Greek meth
just smear a blac
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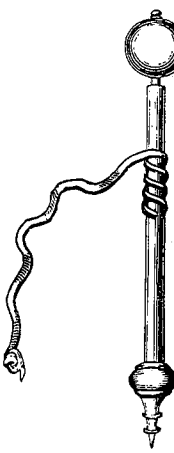

4.27 Three types
wood for startin

Twenty da
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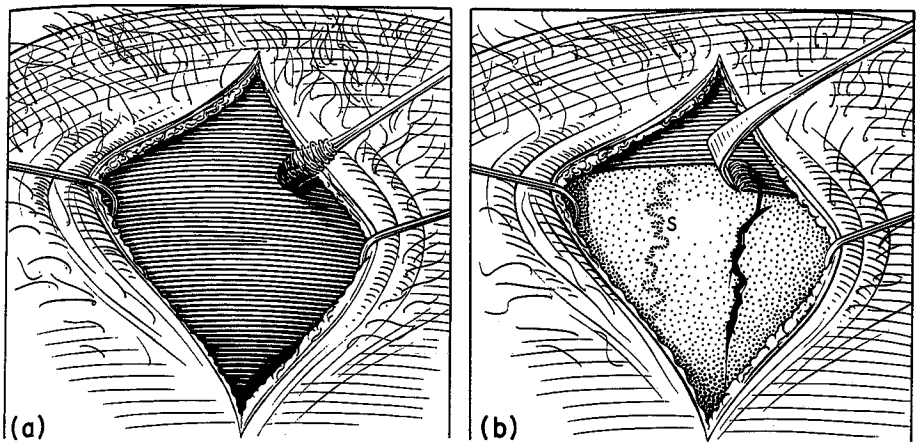
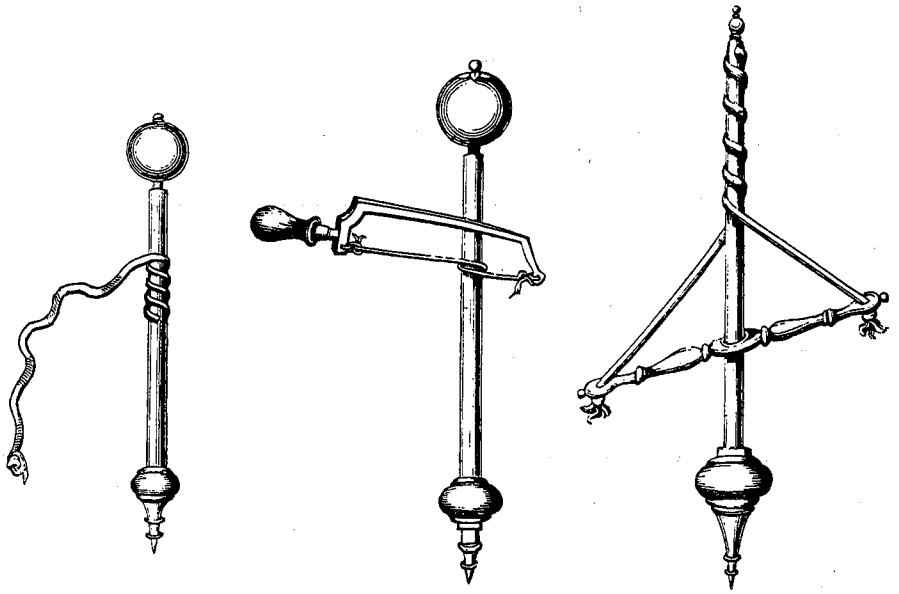
His trouble is d
besides plasters
it is somewhat
accidents."[154]

Patient No. 8

Fighting a
staggers in and



4.26 Greek method for distinguishing a crack in the skull from a normal suture (s): just smear a black paste on the bared skull (a) and scrape (b). Only cracks will show up.



4.27 Three types of Greek bone-drill (*trýpanon*). Drills like these were also used on wood for starting fires, as in Egypt.

Twenty days after the operation the little groom is shaking with fever, his face red and swollen beyond recognition.[152] The bacteria have taken over. His trouble is diagnosed as erysipelas and is treated with a cathartic,[153] besides plasters on the face and a burn with the cautery. He will survive; but it is somewhat startling to read that "his wound had nothing to do with these accidents."[154]

Ἰατρός

Patient No. 8: A Chest Like Boiling Vinegar

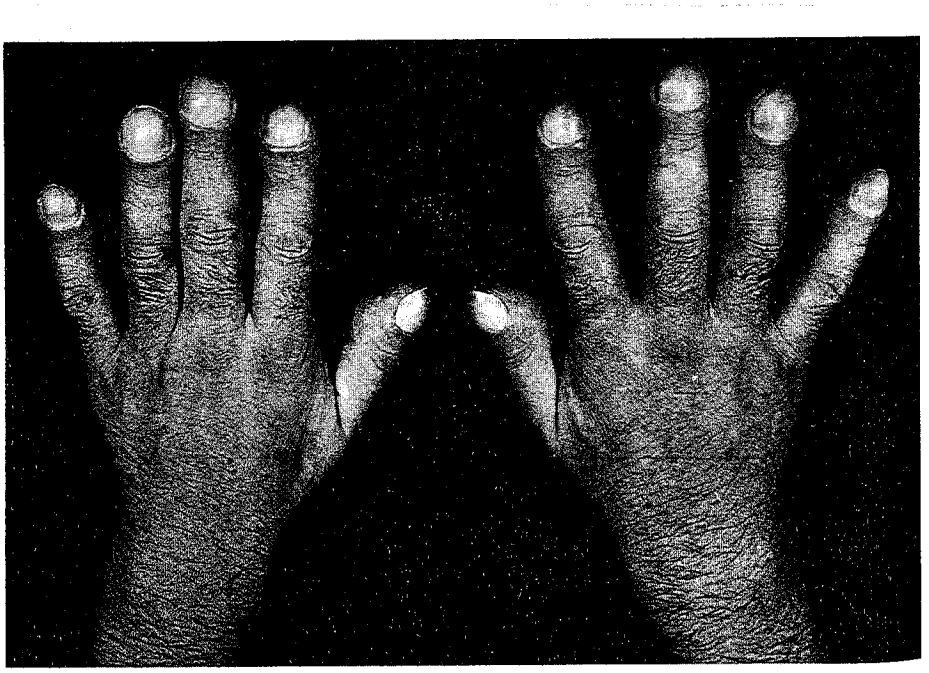
Fighting a fit of cough—a long, rumbling cough—a withered old woman staggers in and takes a seat. She is out of breath and obviously feverish. When

she has quieted down a bit, the iatrós kneels down behind her, puts an ear to her back, and listens for a long while. If it was a surprise to see him practice auscultation, there is no word for what will happen now. This ancient Greek is about to draw conclusions worthy of a modern treatise of pathophysiology—except, alas, for the therapy.

To him, it sounds "as if it were boiling inside like vinegar."[155] He takes this to mean, quite correctly, that there is fluid inside the lung.[156] Then, unlike many of today's physicians, who leave their patients in the dark, he tells the old woman the complete story as he sees it. This is actually a calculated display of insight, on the principle that it impresses a patient to be told his own symptoms before he has a chance to describe them himself.[157] His speech might run: "You must have been coughing like this for a long while. I can tell from your fingernails. Remember how they used to be curved only sideways, like mine; now see how they are curved also the other way (Fig. 4.28). Your toenails must look the same. This means that your lungs are sick. You will probably have more fits of coughing and fever like this one, and the tips of your fingers might even become swollen. Then perhaps the water in your lungs will seep out and pour into the space all around. Should this happen, I will be able to help you by drilling a little hole in a rib and tapping that water, a little at a time.[158] In the meanwhile, I will keep studying your urine, which tells me how your disease progresses.[159] I shall give you some fumigations, and a diet that will dry up your body."

Note how this talk has improved the situation. The patient is greatly relieved to know that she is in the hands of a doctor of obvious competence, who knows the present as well as the past and the future; he even guessed about the fingernails. She has also escaped the knife. If she gets worse, she can

Ἰατρός



4.28 "Hippocratic fingers." This strange effect of chronic lung disease is not yet well understood.

hope for a treatment; and in the meantime her medicine is not too unpleasant. It was worthwhile going to the iatréion.

The physician, too, is gratified. He may not have spelled out the diagnosis in modern terms (chronic bronchitis on bronchiectasis with recurrent bronchopneumonia), but this is not at all his concern, for almost anybody can tell what is going on right now. What counts most is to be able to anticipate what is going to happen—*prognosis* rather than diagnosis. In his eyes, he should be congratulated for making what he calls a good prognosis; good, that is, primarily for his ego. Today's physicians behave somewhat alike when they speak of a good diagnosis after having discovered a hidden cancer.

To understand the peculiar lack of interest in diagnosis in ancient Greece, remember also that disease, in general, was always viewed as the same: an imbalance. The author of *On Breaths* goes so far as to say, "Of all diseases the fashion is the same, only the seat varies."[160] The satisfaction of a beautiful diagnosis was therefore minimized, and the iatrós replaced it with a "beautiful prognosis." Here is a rather shocking example: "If convulsions do appear, death is likely, and there is a chance for a beautiful prognosis."[161]

As to the curving nails and swelling fingertips, they belong to the category of strange but true: they are common effects of chronic lung disease. Although theories abound,[162] on the whole the phenomenon is not understood much better today than in the days of the iatréion. French clinicians still record it as *hippocratisme digital.*

Note also that the iatrós has been able to recognize the presence of fluid bubbling in the bronchi by placing his ear on the chest. But what can he be hearing that is *boiling like vinegar?* Other readings have been proposed for this passage, such as "smelling like vinegar"[163] or "seething like sour wine,"[164] which is chemically impossible; none improves the meaning. The answer is probably the simplest. It occurred to me one day that it might help to pour some vinegar into a pan and heat it. As it started to boil, it produced a very special rushing, crackling noise, quite unlike that of boiling water, and comparing very well with the sound heard over a lung when fluid obstructs the finest bronchi, a sound called "fine moist râles" in modern terminology. The iatrós was familiar with the procedure of boiling vinegar, a common step in preparing drugs and plasters.[165]

Patient No. 9: Punches in the Head

Ἰατρός

The next patient looks like a nightmare: a giant, with scarcely any face, just a bloody mess of black eyes, swollen ears, and a broken nose. This is the new breed of professional boxer.[166]

Boxing had degenerated by 400 B.C. In the old days it had been a game like all others, practiced by gallant young amateurs whose fists were protected by soft leather thongs (Fig. 4.29). Then over-competition bred professionalism, which spoiled the game.[167] Boxing was taken over by huge brutes, "pothunters," who wandered from city to city in search of a bloody fight to the finish (Fig. 4.29). They wore a new kind of sharp, cutting gloves called *sphái-*