CHAPTER-V

SURGICAL INSTRUMENTS IN SUÁRUTA

SAÊHITË
INTRODUCTION

SURGICAL INSTRUMENTS HAVE BEEN MANUFACTURED SINCE THE DAWN OF PRE-HISTORY. ROUGH TREPHINES FOR PERFORMING ROUND CRANIOTOMIES WERE DISCOVERED IN NEOLITHIC SITES IN MANY PLACES. IT IS BELIEVED THAT THEY WERE USED BY SHAMANS TO RELEASE EVIL SPIRITS AND ALLEVIATE HEADACHES AND HEAD TRAUMAS CAUSED BY WAR INFLICTED WOUNDS.

IN THE ANTIQUITY, SURGEONS AND PHYSICIANS IN GREECE AND ROME DEVELOPED MANY INGENIOUS INSTRUMENTS MANUFACTURED FROM BRONZE, IRON AND SILVER, SUCH AS SCALPELS, LANCETS, CURETTES, TWEEZERS, SPECULAE, TREPHINES, FORCEPS, PROBES, DILATORS, TUBES, SURGICAL KNIVES, ETC. THEY ARE STILL VERY WELL PRESERVED IN SEVERAL MEDICAL MUSEUMS AROUND THE WORLD. MOST OF THESE INSTRUMENTS CONTINUED TO BE USED
IN MEDIEVAL TIMES, ALBEIT WITH A BETTER MANUFACTURING TECHNIQUE.

IN THE RENAISSANCE AND POST RENAISSANCE ERA, NEW INSTRUMENTS WERE AGAIN INVENTED AND DESIGNED, IN ORDER TO ACCOMPANY THE INCREASED AUDACITY OF SURGEONS. AMPUTATION SETS ORIGINATED IN THIS PERIOD, DUE TO THE INCREASED SEVERITY OF WAR INFLECTED WOUNDS BY SHOT, GRAPNEL AND CANNON.

Titanium and vanadium were available for the manufacturing of these instruments. Precision instruments for microsurgery in neurosurgery, ophthalmology and otology were possible and, in the second half of the 20th century, energy based instruments were first developed, such as electrocauteries, ultrasound and electric scalpels, surgical tools for endoscopic surgery, and finally, surgical robots.

Instruments and their composition were noted occasionally by classical authors, including Hippocrates in the fourth century A.D., Galen in the second, Oribasius in the fourth, Sušruta before the sixth, Paul of Aegina in the seventh, and Alhucasis in the tenth. Sušruta's text had been dated between the sixth century B.C. and the sixth century A.D.; the oldest known extant manuscript was written before the eighth
CENTURY A.D., ALTHOUGH IT IS BELIEVED TO REPRESENT A MUCH OLDER TRADITION. HE DESCRIBED 101 BLUNT INSTRUMENTS AND 20 SHARP INSTRUMENTS, MOSTLY MADE OF IRON OR STEEL.

SURGICAL INSTRUMENTS, AND THEIR NAMES, USE AND CONSTRUCTION, MODE OF HANDLING THE DIFFERENT SURGICAL INSTRUMENTS, THEIR COMMENDABLE FEATURES, SHARPENING, EDGING, TEMPERING AND ENUMERATION OF CASES WHERE THEY SHOULD BE EMPLOYED ETC. ARE DESCRIBED IN THE EIGHTH CHAPTER OF SūRUTA SĀHITI.

WE CAN SEE BY THE QUALITY OF THE SURGICAL INSTRUMENTS USED IN ANCIENT INDIA THAT, INDIANS WERE EXPERTS IN METALLURGY AS IN CHEMISTRY. THESE INSTRUMENTS WERE MADE FOR THE ĀLVA SECTION OF ÉYURVÉDA THAT HAD WIDE ACCLAIM, AND MANY OF THESE INSTRUMENTS HAD MUCH SIMILARITIES TO THE MODERN SURGICAL INSTRUMENTS WE USE IN KEY HOLE SURGERY AT PRESENT. THE FOLLOWING CHAPTER DESCRIBES THE
NUMBER OF SURGICAL INSTRUMENTS

The ancient surgeons made use of a good number of surgical instruments. They are described to be of two kinds, the yantras and the sastras, i.e., the blunt and the sharp instruments. Sūrūta describes no less than one hundred and one varieties of the blunt instruments, and twenty different kinds of sharp instruments.

Sūrūta mentions hundred and one varieties of the blunt instruments, the surgeons' hand is rightly considered as the principal instrument, for without its help, no instrument can properly be used, and every surgical operation is under its control. They are recommended to be used for the extraction of Alya or foreign bodies.

BLUNT INSTRUMENTS
THERE ARE ONE HUNDRED AND ONE SURGICAL INSTRUMENTS IN THE BLUNT CATEGORY (YANTRA), AMONG WHICH THE PHYSICIAN'S HAND IS THE FOREMOST BECAUSE THE OTHERS CANNOT BE USED WITHOUT IT AND NO PROCEDURE CAN BE PERFORMED IN ITS ABSENCE. ANY FOREIGN OBJECT LODGED IN THE BODY (ALYA) IS A SOURCE OF PHYSICAL AND MENTAL DISTRESS AND THE INSTRUMENTS ARE PRIMARILY DESIGNED AND MADE TO REMOVE THEM.

INSTRUMENTS FOR SURGICAL OPERATIONS

THE MA действиельГрам

THE MA₁ ALГрам measures six fingers in length and is provided with a round or circular face. It is described as a round for circular headed cutting instrument, having a length of six a₁'гула. Two sub varieties are noted one with a circular edge and the other shaped like a razor. VиGBHAра, however, describes the blade to be shaped like the index finger when its nail points towards the palm of the end.

It is said to have been principally used for the operation of cutting the rough and scraping. So it is recommended to be used in the operative treatment of enlarged tonsil. It is also used for piercing the skull of a dead foetus in utero to help its easy extraction by other instruments. So any other presenting part causing difficulty in the delivery of the dead foetus, is of be but with it.
SU\textcircled{\textdegree}RUTA RECOMMENDS A MA\textasciitilde AL\textcircled{\textdegree}GRA KNIFE IN OPHTHALMIC PRACTICE FOR SCRAPING AWAY THE MEMBRANOUS EXPANSION IN THE OPERATION OF PTERYGIIUM AND OTHER OPHTHALMIC OPERATION, SUCH AS FOR VASCULAR NETWORK AND NODULES ON THE EYE BALL.

THE KARAPATRA

THE KARAPATRA IS THE SAME AS THE MODERN SAW.\textsuperscript{9} AN INSTRUMENT HAVING THE BLADE IN THE FORM OF A HAND, THE FINGERS BEING REPRESENTED BY THE TEETH OF THE SAW, RESEMBLANCE TO A CARPENTER'S SAW KNOWN AS KARAPATRA\textsuperscript{10}. IT SEEMS THAT SAWS OF VARIOUS SIZES ARE USED. SU\textcircled{\textdegree}RUTA MENTIONS ITS LENGTH TO BE SIX A'GUL\textdegree. ITS PRINCIPAL USE IS TO SAW A BONE. SOME TIME IT IS RECOMMENDED FOR THE PURPOSE OF SCRAPING.

THE VRIDDHIPATRA

THE TERM VRIDDHIPATRA SIGNIFIES A RAZOR. A
VRIDDHIPATRA measures seven fingers in length, the handle alone measuring five fingers.\textsuperscript{11} This sharp cutting instrument is called VRDDHIPATRA from its resemblance to the leaf of a medicinal plant called VRDDHI.\textsuperscript{12} Two varieties of this knife are described by VIGBHATA\textsuperscript{13}. One is straight throughout and it is to be used for opening pointed superficial abscesses; and the other has the end bent or curved. Again amongst the second class of curved knives, some have their ends long and therefore called DIRGHAVAKTRA or long-mouthed, and these are to be used for opening the deep seated abscesses, while others have their ends short and therefore called HRASVAVAKTRA or short-mouthed, and these are to be used for superficial abscesses that would not point. Some resemble the razor in shape used by the barbers. SUE\textsuperscript{RUTA} recommends the use of razor, scissors and pinchers for shaving the
PARTS BEFORE OPERATION; FOR 'THE HAIRS.'
SUŚRUTA USES THE VRDDHIPATRA KNIFE FOR THE REMOVAL OF LIE SCROTAL TUMOUR. VRDDHIPATRA WAS ALSO USED BY THE ANCIENT VETERINARY SURGEONS.

**THE NAKHAĀASTRA**


**MUDRIKA**

IT IS DESCRIBED TO BE A CUTTING INSTRUMENT OF THE SIZE OF THE LAST PHALANX OF THE INDEX
FINGER; IT IS ALSO CALLED A ‘GULÇAstra OR FINGER KNIFE. IT IS RECOMMENDED TO BE USED FOR CUTTING THROUGH NEOPLASMS IN THE THROAT.

THE UTPALAPATRA

THE UTPALAPATRA RESEMBLES A LOTUS LEAF IN SHAPE. THE KNIFE IS DESCRIBED TO HAVE THE SHAPE OF A PETAL OF THE BLUE LOTUS. THE END IS LONG, SHARP AND POINTED. THE UTPALAPATRA IS DÇRGHA¥AKTRA OR LONG BLADED, WHILE THE ARDDH£DH£RA IS THE HRASV¥AKTRA OR SHORT BLADED KNIFE. IT IS TO BE USED FOR CUTTING THROUGH AND PUNCTURING THE PARTS. IN THE AVAVAIDYAKA, THE UTPALAPATRA AND VRTHIPATRA KNIVES ARE RECOMMENDED TO BE USED IN PUNCTURING THE VEINS IN PHLEBOTOMY. 18

THE ARDDHÉDHÉRA

THE ARDDH£DH£RA (LANCET) MEASURES EIGHT FINGERS BREADTH IN LENGTH, BEING ONE FINGER BROAD AT THE MIDDLE, AND TWO FINGERS AT THE
BLADE. $Ardhdh;Drh;ra$ is as a single edged knife.
It is eight a'gul¢ long; the blade is two a'gul¢ long and one a'gul¢ wide, and the handle six a'gul¢ long. It is to be used for incision and division of parts of the body.

THE SÍCI

The $sék¢$ is the same as the modern needle.¹⁹ Three needles are recommended to be used for applying sutures; also extraction of foreign bodies from the soft structures and also for evacuating abscesses.²⁰ They should be strongly made and rounded in shape. At one end they are flattened, grooved and pierced with an eye for the suture.

The groove is said to have been intended to be the bed of the suture during stitching to prevent it from doing any harm to the tissue. In fleshy parts such as the thighs, a three ribbed needle, three a'gul¢ long, is advised to be used. For less fleshy parts and wounds

THE KUÁAPATRA

THE KUÁAPATRA IS SO CALLED FROM ITS RESEMBLANCE TO THE BLADE OF A KUÁA GRASS. IT IS A FORM OF KNIFE RESEMBLING IN SHAPE THE LEAF OF A KUÁA GRASS (POACYNOSUROIDES). THE INSTRUMENT SHOULD BE SIX A'GULÇ LONG; THE BLADE MEASURING TWO A'GULÇ AND THE HANDLE FOUR A'GULÇ, BUT ACCORDING TO BHOJA, THE HANDLE IS THREE A'GULÇ LONG. IT IS TO BE USED FOR DRAINING PUS FROM ABSCESS. CAKRADATTA USES KUÁAPATRA AS A BLEEDING LANCET.

IN THE YOGARATNÍKARA, THE AUTHOR ADVISES US TO ADOPT THIS METHOD OF BLEEDING, IN THE
TREATMENT OF TUMOURS IN THE NECK. PIŁAKI PYA 
MENTIONS KUŚAPATRA AND DESCRIBES IT AS BEING 
SHAPED LIKE A KUŚA GRASS.  

AN ATEMUKHA 

AN ATEMUKHA RESEMBLES THE BILL OF A BIRD 
OF THE ATE SPECIES. THE BLADE OF AN ATEMUKHA 
MEASURES TWO FINGERS IN LENGTH, THE HANDLE 
MEASURING FIVE FINGERS AND THUS GIVING AN 
ENTIRE LENGTH OF SEVEN FINGERS. THIS INSTRUMENT 
IS DESCRIBED TO HAVE THE SHAPE LIKE THE BEAK 
OF THE JALAVARDHANČ BIRD OR ATI, A BIRD LIVING 
IN THE MARSHES. IT IS SIX ĠULČ LONG; THE BLADE 
MEASURING TWO AND THE HANDLE FOUR ĠULČ. SO, 
IT IS OF THE SAME SIZE AS THE KUŚAPATRA TO 
WHICH IS ALSO RESEMBLES IN FUNCTION. BHOJA IS OF 
OPINION THAT ITS BLADE IS ONE AND THE HANDLE 
SEVEN ĠULČ LONG.  

THE ĀARĖRIMUKHA 

THE ĀARĖRIMUKHA (SCISSORS) IS SO CALLED 
FROM THE RESEMBLANCE OF ITS BLADES TO THE
BILLS OF A ĀRIRI BIRD AND LOOKS SOME WHAT LIKE A MODERN BLACKSMITH'S CLIPPER, THE MEASURE OF ITS ENTIRE LENGTH BEING TWELVE FINGERS. THIS INSTRUMENT IS A PAIR OF SCISSORS RESEMBLING THE FACE OF THE LONG BEAKED BIRD CALLED ĀRIRI. DALHA, A DESCRIBES TWO VARIETIES OF THE BIRD, ONE WITH WHITE SHOULDERS, AND THE OTHER WITH RED HEAD. IT IS THE FORMER KIND WHICH IS REFERRED TO HERE. SUKRUTA DESCRIBES ITS LENGTH TO BE TEN ĀGULÇ, WHILE DALHA, A MENTIONS THE LENGTH TO BE TWELVE ĀGULÇ.

IT IS RECOMMENDED TO BE USED FOR EVACUATING ABSCESS ETC. SUKRUTA MENTIONS KARTARÇ AS A SYNONYM BUT VIBHAṬA COUNTS IT AS A SEPARATE INSTRUMENT. HE DESCRIBES KARTARÇ AS A PAIR OF SCISSORS USED BY THE BARBERS FOR CLIPPING HAIR AND IS SAID TO HAVE BEEN NECESSARY FOR DIVIDING THE NERVES, LIGAMENTS AND FINE HAIRS.

THE ANTARMUKHA
THE ANTARMUKHA IS SEMI CIRCULAR IN SHAPE AND IS PROVIDED WITH A TOOTHED EDGE LIKE THAT OF A HAND SAW. SUŘUTA DEScribes ANOTHER VARIETY OF SCISSORS, USED PRINCIPALLY FOR EVACUATING ABScesses. IT IS SO NAMED, FOR ITS STRAIGHT CUTTING EDGES ARE WITHIN ITS CURVED CLAWS IT IS SAID TO BE SIX Á'GULÇ LONG AND ONE AND A HALF Á'GULÇ BROAD.

IT SEEMS THAT THE CURVATURE OF THE BLADE VARIED WIDELY; AND ViGBHATA DEScribes A VARIETY CALLED ARDDHACANDRANAN OR 'HALF-MOON FACED' SCISSORS IN WHICH THE BLADES ARE COWED LIKE THE HALF-MOON. IT HAS THE LENGTH OF EIGHT Á'GULÇ, THE BLADE MEASURING ONE AND HALF Á'GULÇ. THIS ALSO IS TO BE USED FOR LETTING OUT PUS FROM ABScesses.

HiRATA, HOWEVER, MENTIONS A ĀSTRA, ALSO CALLED ARDDHACANDRA OR HALF-MOON, BUT HE RECOMMENDS IT USE FOR EXCISING THE PROLAPSED ARMS OF A DEAD FOETUS TO EFFECT ITS DELIVERY.
THIS INSTRUMENT CANNOT BUT BE A KNIFE, FOR IT SEEMS DIFFICULT TO CUT OFF THE ARM, EVEN OF A FOETUS, WITH A PAIR OF SCISSORS.

THE TRIKÍRCAKA

THE TRIKÍRCAKA (TROCAR) IS PROVIDED WITH THREE SEPARATE BLADES. THE INTERVENING SPACE BETWEEN THE COUPLE OF BLADES ATTACHED TO A HANDLE MEASURING FIVE FINGERS IN LENGTH. IS EQUAL TO THE WIDTH OF A VṚHI SEED, ITS ENTIRE LENGTH BEING EIGHT FINGERS. THIS INSTRUMENT IS A THIN EDGED SHARP OR TROEAR. IT CAN BE BETTER EXPLAINED IF WE UNDERSTAND BY THE TERRA INSTRUMENT CONSISTING OF THREE NEEDLES FIXED ON A ROUND WOODEN HANDLE. ACCORDING TO SÚRUTA, THE LENGTH OF THE INSTRUMENT IS SIX Á´GULÇ. BUT OTHERS DESCRIBE IT AS EIGHT Á´GULÇ LONG, THE BLADE AND THE HANDLE MEASURING THREE AND FIVE Á´GULÇ RESPECTIVELY. THE DISTANCE BETWEEN THE EDGES IS THE BREADTH OF A GRAIN OF RICE. THE END OF
TIRE HANDLE IS ORNAMENTED WITH A CIRCULAR METALLIC PLATE AS A RING.

IT IS RECOMMENDED TO BE USED FOR EVACULATING ABSCESSSES AND FOR DRAINING BLOOD FROM THE NASAL POLYPUS. CARAKA MENTIONS AN INSTRUMENT CALLED $K\text{\textregistered}RCA$. TWO OTHER INSTRUMENTS ARE DESCRIBED BY $V\text{\textregistered}GBHAT\text{\textregistered}$ AS BEING CONSTRUCTED ON A SIMILAR PRINCIPLE.\textsuperscript{27} ONE IS NAMED $K\text{\textregistered}RCA$ AND THE OTHER, KHAJA. THE $K\text{\textregistered}RCA$, HE DESCRIBES AS AN INSTRUMENT 'CONSISTING OF SEVEN OR EIGHT ROUNDED SHARP NEEDLES, FOUR A\textregistered GUL\textregistered LONG, NICELY BOUND TOGETHER BY A CORD AND TIGHTLY FIXED ON PARTICULAR WOODEN HANDLE.' HE MENTIONS ITS USE IN THE OPERATION OF SCRATCHING TO CURE BALDNESS AND THE BROWN AND BLACK SPOTS ON THE FACE. FOR SCARIFYING A BALD SPOT, CAKRADATTA USES NEEDLES, ROUGH LEAVES, ETC.

THE KU\textregistered H\textregistered RIKA
THE *KUTHIRIKA* (SMALL, BLUNT AXE) MEASURES SEVEN FINGERS AND A HALF IN THE HANDLE, THE BLADE IS HALF A FINGER IN WIDTH AND IS BLUNTED LIKE THE TOOTH OF A COW.\textsuperscript{28} IT IS A SMALL INSTRUMENT SHAPED LIKE AN AXE, SO CALLED FROM ITS RESEMBLANCE TO *KUTTLIARA*, AN AXE WHICH IS STILL USED IN INDIA FOR CUTTING WOOD. *VIGBAHA* SAYS THAT THE BASE OF THE BLADE IS THICKER AND BROADER THAN THE END AND IS FITTED TO A HANDLE, SEVEN AND A HALF A `GUL\c{c}` LONG.\textsuperscript{29} THE BLADE WHICH IS SHAPED LIKE THE TOOTH OF A COW, HAS THE WIDTH OF ONE A `GUL\c{c}`. BHOJA DESCRIBES THE WIDTH OF THE BLADE TO BE HALF A `GUL\c{c}`.

*VIGBAHATA* RECOMMENDS THE *VRIHIMUKHA* KNIFE, WHILE THE *KUTHARIKA* IS ADVISED TO BE USED IN VENESECTION ON BOLT STRUCTURES. *PILAKIPYA* MENTION THE *KUTHIRA* AND DESCRIBES ITS SHAPE TO BE LIKE AN AXE. IT IS TO BE USED FOR EXCISION AND SCARIFICATION.\textsuperscript{30} HE DESCRIBED
ANOTHER SURA CALLED VATSADANTA (THE CALF'S TOOTH); IT IS TEN A´GUL¢ LONG; AND THE MOUTH OF THE INSTRUMENT IS ONE AND A HALF A´GUL¢ BROAD. IT IS ALSO TO BE USED FOR EXCISION.

BLEEDING FROM THE JUGULAR VEIN, HE (ALBUCASIS) DESCRIBES MUCH IN THE SAME WAY THAT IT IS NOW PRACTICED BY VETERINARY SURGEONS, Namely, BY PLACING A SORT OF SCALPEL BENT AT THE POINT, WHICH HE CALLS FISSORIUM, UPON THE VEIN, AND STRIKING THE INSTRUMENT WITH A HAMMER OR SOME SUCH BODY. HE GIVES DRAWINGS OF VARIOUSLY SHAPED LANCETS FOR OPENING THE VEINS OF THE ARM.

TERRIERS BLEED WITH A FLEAM, WHICH THOUGH APPARENTLY A CLUMSY METHOD OF OPERATING, IS CERTAINLY SAFER THAN THE LANCET IN UNKNOWN HANDS. 'IN BLEEDING WITH A FLEAM, THE NEAR SIDE IS MOST CONVENIENT. IN SKILFUL HANDS, THERE IS NO OCCASION FOR A BLOOD STICK, AS THE FLEAM MAY BE STRUCK WITH THE RIGHT HAND IF IS MADE BROAD
AND ROUND AT THE BACK. IT ALSO MAY BE MADE MUCH SMALLER AND NEATER THAN THAT GENERALY EMPLOYED.' THERE IS A DRAWING OF SUCH AN IMPROVED FLEARM WHICH MUCH RESEMBLE IN APPEARANCE THE KUTHRI OF THE ANCIENT.

THE VRİHIMUKHA

THE VRİHIMUKHA MEASURES SIX FINGERS IN ITS ENTIRE LENGTH AND ITS TOP IS LIKE THAT OF A VRİHI SEED,³¹ AND THE EDGE IS CUT INTO SMALL THORN LIKE PROJECTIONS. ³² It is described as a kind of trocar, the sharp end being pointed and shaped like a grain of paddy it is six a´GULÇ long, the handle being two and the blade four a´GULÇ (BHOJA). BUT ViGBHAṬA DESCRIBES THE LENGTH OF THE BLADE TO BE ONE AND A HALF A´GULÇ.³³

IT IS ADVISED TO BE USED FOR PARACENTESIS ABDOMINIS IN ABDOMINAL DROPSY. SUḌRUTA SAYS:

VÍGBHÁṬA ADVISES TO SURROUND BROAD BANDAGE ROUND THE ABDOMEN BEFORE TAPPING IT BY THE INSTRUMENT, WHICH HE RECOMMENDS TO BE INTRODUCED UP TO ONE A˚GULÇ. CAKRADATTĀ REFERS TO WORKS ON SURGERY FOR THE SURGICAL TREATMENT OF ASCITES. A SMALL INCISION IS DIRECTED TO BE MADE BEFORE THE PUNCTURE.

IN THE ÁÇVA VAIDYAKA, FOR THIS OPERATION, THE UTPALAPATRA KNIFE IS RECOMMENDED;³³ AN INCISION FOUR A˚GULÇ LONG IS DIRECTED TO BE MADE ABOVE OR BELOW THE NAVAL OF THE HORSE, AND THEN THE END OF THE KNIFE IS TO BE PLUNGED INTO THE ABDOMINAL CAVITY UP TO ONE A˚GULÇ. THE VRËHIMUKHA IS ALSO ADVISED TO BE SIMILARLY USED.
IT IS ALSO TO BE USED FOR PUNCTURING THE VESSELS IN PHLEBOTOMY (Vįgbhāṭa) ESPECIALLY IN THE FLESHY PARTS OF THE BODY. CAKRADATTA USES VRćHIMUKHA IN PHLEBOTOMY AND SAYS: 'THE SHARP END OF THE VRćHIMUKHA SHOULD BE KEPT UNDER THE PALM BETWEEN THE THUMB AND INDEX FINGER AND IS TO BE THRUST INTO THE SEAT OF PUNCTURE.'

SU₂RUTA DIRECTS US TO USE IT IN TAPPING THE HYDROCLE: 'THEN THE HYDROCLE IS TO BE WRAPPED ROUND WITH A BANDAGE. THE FLUID IS NEXT TO BE DRAINED BY TAPPITINT WITH A VRćHIMUKHA ON THE LOWER PART OF THE SCROTUM, LITTLE EXTERNALLY TO THE SUTURE.' SIMILAR DIRECTIONS ARE GIVEN IN THE YOGARATNǐKARA, CAKRADATTA ALSO GIVES A SIMILAR DESCRIPTION.

THE ĖRA

THE ĖRA RESEMBLES THE AWL OF A COBBLER AND MEASURES TEN FINGERS IN ITS ENTIRE LENGTH, THE BLADE IS WIDE AS THE SEED OF A SESAMUM AND HAS THE GIRTH OF A DĀRVA (GRASS) STEM.
IT IS A LONG SHARP NEEDLE IN HANDLE, SO CALLED FROM ITS RESEMBLANCE TO THE SHOEMAKER'S INSTRUMENT KNOWN AS AWL. IT HAS A TOTAL LENGTH OF SIXTEEN ŚGULÇ, WITH A SHARP END OF THE SIZE OF A SESAMUM SEED. THE HANDLE IS TAPERING LIKE COW'S TAIL AND IS EQUAL IN CIRCUMFERENCES TO THE YOUNG STEM OF DURVA (UNODON DACTYLON).

SUŚRUTA MENTIONS ITS LENGTH TO BE SIX ŚGULÇ. VIGBHAṬA DESCRIBES THE LENGTH TO BE ONE ŚGULÇ, THE BASAL HALF BEING ROUND, AND THE TERMINAL HALF, FOUR CORNERED AND SHARP POINTED. THE TERMINAL PART IS INTRODUCED INTO THE INFLAMMATORY SWELLINGS TO CONFIRM THE DIAGNOSIS OF SUPPURATION. IT IS ALSO TO BE USED TO DRAIN THE CONGESTED BLOOD VESSELS IN THE MATRIX OF THE NAILS AS A RESULT OF TRAUMATISM.

IT IS ALSO SAID TO HAVE BEEN USED FOR PERFORATING A THICK LOBULE OF THE EAR, THOUGH,
FOR THIS PURPOSE ANOTHER INSTRUMENT CALLED
KAR, A VEDHANÇ OR EAR PERFORATOR, A NEEDLE
SPECIALY MEANT FOR PERFORATING THE LOBULES
OF THE EARS, IS MENTIONED. IT IS THREE A´GULÇ
LONG, HAVING A SLIT OR EYE IN THE THREE FOURTHS
OF ITS LENGTH. THE BARBERS USED A SIMILAR
NEEDLE TO PERFORATE THE EARS ON THE CEREMONY
OF TONSURE.

FOR PIERCING THE LOBULE OF THE EAR,
ANOTHER INSTRUMENT IS MENTIONED. IT IS CALLED
JUTHIKA, FROM ITS END RESEMBLING IN SHAPE THE
CONICAL BUT OF JUTHIKA FLOWER (JASMINUM
AURICULATURN).

SU¿RUTA USES İRA OR PANIMANTHA TO
PERFORATE THE BONE IN DISEASES OF THE
MEDULLARY CANAL CAUSED BY THE OBFSTRUCTED
AND DERANGED AIR. THE SURGEON INTRODUCES ONE
END OF A TUBE OPEN AT BOTH ENDS INTO THE CANAL
THROUGH THE HOLE IN THE BONE, WHILE THROUGH
THE OTHER END THE HE SUCKS OUT THE AIR BY HIS
MOUTH. FOR PERFORATING THE EARS OF THE ELEPHANTS, A SIMILAR NEEDLE IS RECOMMENDED BY PŁAKI PYA. IT IS KNOWN AS KARMAKA OR NALI.\textsuperscript{36}

THE VETASAPATRA

THE VETASAPATRA (KNIFE) RESEMBLES THE LEAF OF A VETASA PLANT. THE BLADE IS FOUR FINGERS IN LENGTH, ONE FINGER IN WIDTH, AND IS KEENLY EDGED, THE HANDLE MEASURING FOUR FINGERS IN LENGTH.

IT IS A LONG SHARP CUTTING INSTRUMENT SHAPED LIKE THE LEAF OF THE RATTAN (CALAMUS ROTANG). ITS EDGE IS FINELY SERRATED AND VERY SHARP. THE BLADE AND HANDLE ARE EQUAL IN LENGTH, MEASURING FOUR A˚GUL$. BHOJA ‘THE BLADE: IS ONE A˚GUL$ WIDE.’ IT IS SAID TO HAVE BEEN USED FOR PUNCTURING VESSELS IN PHLEBOTOMY.

THE VÉDIĀA

THE VÉDIĀA IS SHAPED LIKE A MODERN FISHING HOOK. IT IS DESCRIBED TO RESEMBLE THE ORDINARY
FISH-HOOK. BHOJA DESCRIBES THE TOTAL LENGTH TO BE SIX A`GULÇ, ITS HOOK BEING HALF A`GULÇ, AND ITS HANDLE FIVE AND A HALF A`GULÇ LONG. THE END IS BENT; THE CURVATURE VARIES AND MAY BE SHAPED LIKE A HALF-MOON. SU¿RUTA SAYS: THE END OF THE HOOK IS SHARPLY EDGED AND IS SAID TO HAVE RESEMBLED THE NEW LEAF OF JAVA (HORDEUM VULGATE).

IT IS RECOMMENDED BY SU¿RUTA TO BE USED FOR EXTRACTION OF FOREIGN BODIES, E.G., THE EXTRACTION OF STONE FROM THE URETHRA.

ITS USE IS ALSO MENTIONED FOR TRANSFIXING THE MEMBRANOUS EXPANSION IN THE OPERATION FOR PTERYGIUM AND FOR FIXING AND DRAGGING THE UVULA AND TONSIL BEFORE THE PERFORMANCES OF ANY OPERATION ON THESE PARTS. CAKRADATTA MENTIONS ITS USE FOR FIXING A GROWTH, BEFORE ITS EXCISION BY THE KNIFE. IT WAS ALSO USED FOR FIXING ANY GROWTH IN THE EYE, PREVIOUS TO ITS EXCISION BY THE MA¸·AL¡GRA.
EVIDENTLY $ViDcA$ WAS USED ON MANY OCCASIONS WHEN IN MODERN TIMES WE USE THE DISSECTION FORCEPS TO STEADY A PART BEFORE EXCISION. $ViDcA$ IS DESCRIBED IN THE $AvAvAyAka$ TO HAVE BEEN SIMILARLY USED DURING THE OPERATION OF PTERYGIFORM IN HORSES. $plAkPyA$ MENTIONS $VADISa$ WHICH IS DESCRIBED AS EIGHT A'GULÇ LONG, THE END BEING ROUNDED LIKE A WHEEL. IT IS TO BE USED FOR RAISING THE MEMBRANES OF THE EYE GLOBE.

SHARP HOOKS WERE USED BY THE GREEKS AND ROMANS, FOR SIMILAR PURPOSES. THE LOOSE OF THE SHARP HOOK FOR FIXING THE PTERYGIFORM IS MENTIONED BY CELSUS, AETIUS, PAUL AND ALBUCASIS.

THE DANTA- $AÀku$

THE $DANTA-cÀku$ (PINCERS FOR EXTRACTING TEETH) SOMEWHAT RESEMBLES THE $vréhimukha$ IN SHAPE. THE FACE OF AN $EÀa$, $I$ (PROBE) IS LIKE THAT OF A $ga$, $Upada$ (EARTH-WORM). ITS HEAD IS HALF AN A'GULÇ LONG. IT IS QUADRANGULAR IN SHAPE
AND HAS A SHARP EDGE. SU₂RUTA DESCRIBED THE END AS SLIGHTLY BENT, SHARP AND SHAPED LIKE THE FRESH LEAF OF JAVA. BHOJA DESCRIBES THE END TO BE LIKE THAT OF THE VRŚHIMUKHA.

VVIGBHAṬA DESCRIBED A SIMILAR INSTRUMENT CALLED DANTALEKHANA OR TOOTH-SCALER. IT IS ALSO QUADRANGULAR IN SHAPE, ONE SIDE BEING SHARP-EDGED AND OPPOSITE SIDE LITTLE LENGTHENED. IT IS RECOMMENDED TO BE USED FOR THE EXTRACTION OF SORDES AND TARTAR FROM THE TEETH.\(^{37}\)

THE PROCEDURE OF THE OPERATION OF TOOTH EXTRACTION IS NOT DESCRIBED IN DETAIL IN THE MEDICAL BOOKS OF THE ANCIENT. BUT THE OPERATION SEEMS TO HAVE BEEN WELL KNOWN, FOR SU₂RUTA DISTINCTLY ADVISES THE STUDENTS TO PRACTICE THE OPERATION OF EXTRACTION ON THE FRUITS OF PANAS (ATROCARPUS INTERGRIFOLIA), VIMBI (CEPHALANDRA INDIRA), VILVA (ÆGLE MARMELOS) AND ON THE TEETH OF THE DEAD ANIMALS.
SUŚRUTA ALSO ADVISES US TO EXTRACT THE
WISDOM TEETH AND TO APPLY CAUTERY TO THEIR
SOCKETS. ALSO WHEN A MOTH BECOMES LOOSE HE
DIRECTS ITS TO EXTRACT IT AND APPLY CAUTERY TO
THE SOCKET. IN THE TREATMENT OF SINUS CAUSED BY
CARIOUS TOOTH, HE ADVISES TO EXTRACT THE TOOTH,
OTHERWISE THE SINUS WOULD EXTEND DOWN TO THE
INFERIOR MAXILLARY BONE.

PİLAKİPYA MENTIONS THE EXTRACTION OF TOOTH OF
THE ELEPHANT BY MEANS OF ENIPADA WHICH IS AN
IRON BAR, THIRTY TWO A˚GULÇ LONG AND EQUAL TO
THE TOOTH IN CIRCUMFERENCE.38

IT WOULD, NO DOUBT, BE INTERESTING TO KNOW
THAT IN ANCIENT INDIA, THEY KNEW HOW TO MAKE
FALSE TEETH TO BE USED BY MEN WHO HAVE LOST
THEM EITHER BY ACCIDENT OR BY EXTRACTION BY
THE DENTISTS.

THE EÅAÛI

THE VAIDYA BEGINS TO PROBE THE WOUND
WITH HIS BLUNT PROBE, THE EÅÅ, I.39 THE EÅÅ, I
(probe) or director; in probing or searching the course or direction of the pus (in a suppurated part), and the sfc (needle; should be used in suturing). Thus we have explained the eight different functions of the instruments in connection with surgical operations.

The eÀ,ś probes, says Caraka, are of two kinds, the hard or metallic probes, and the soft probes such as the young stems of plants. The hard probes are required for deep sinuses in the fleshy parts and the sides of the body, while the softer varieties are used for probing the superficial sinuses.

The ends of the probes are generally shaped like the head of the earthworms. Suśruta describes them to be eight a´gulś long. They are to be used as probes to ascertain the direction of sinuses. The blunt probes have been described before under the

IF THE CORD BE FOUND INEFFICIENT FOR THE PURPOSE, A SECOND THREAD IS TO BE TIED SIMILARLY. THIS METHOD OF TREATMENT IS RECOMMENDED FOR THE WEAK AND TIMID PATIENTS. THE NEEDLE SHAPED PROBE IS ALSO TO BE USED IN THE EXTIRPATION OF NEW GROWTHS BY MEANS OF CAUSTIC THREADS. CAKRADATTA ALSO DESCRIBED THIS OPERATION; EVIDENTLY HE COPIES IT FROM SU¿RUTA. IN THE YOGARATN¡KARA, THE VERSES
DESCRIBING THE OPERATION ARE ALSO QUOTED. VIGŚHAṬA ALSO MENTIONS A NEEDLE SHAPED PROBE FOR THE SAME PURPOSE.\textsuperscript{10}

VIGŚHAṬA DESCRIBED COPPER PROBES HAVING THE SHARP ENDS SHAPED LIKE THE BUDS OF KURAVĀKA (BALERIA CRISTATA) TO BE USED IN THE OPERATION OF CATARACT. SUBRUTA DESCRIBES SUCH A PROBE TO BE EIGHT ĀGULÇ LONG, MADE OF COPPER OR IRON, OR GOLD, THE ENDS BEING SHAPED LIKE BUDS.

A THREAD IS SPIRALLY TWISTED ROUND THE MIDDLE OF THE INSTRUMENT FOR A LENGTH OF A THUMB'S BREATH, TO AFFORD A FIRM GRASP BY THE SURGEON'S FINGERS. THIS INSTRUMENT MUST NOT BE ROUGH, THICK OR VERY SHARP, FOR THEN THERE WOULD BE A GREATER CHANCE OF THE EYE BEING INJURED MORE THAN IS NECESSARY AND AT MANY PLACES. SO ALSO IN COUCHING OF CATARACT, CELSUS SAYS: 'THEN A NEEDLE IS TO BE APPLIED, SHARP SO AS TO PENETRATE BUT NOT TOO FINE.'
Pilakpya mentions ēāā in the surgical treatment of diseases of the elephants. He describes three probes, smooth and shaped like the collyrium rods. They are recommended to be ten, twenty and thirty ā gulc long respectively.

Of the above said instruments the mā, aligra and the karapatra should be used in incising and scraping. The vriddhipatra, the nakaḥāśṭra, the mudrika, the upalapatra, and the arddhiḍhira, should be employed in incising (chedanam) and excising (bhedanam); and the kuṭapatra, the sēc, the atemukha, the ṣaraṇimukha, the trikṣercaka and the antarmukha should be made use in exuding or secretting (vṛṣram, am). The kutharika, the vrchimukha, the ṣara, the vetasaṭpatra and the sēc (needle) should be used in puncturing. The vidēśa and the dantaḍa ḋu should be used in extracting solid bodies.
HANDLING OF INSTRUMENTS

CAUGHT HOLD OF WITH THE THUMB AND THE INDEX FINGER (PRADEÀINÇ).


THE TOP ENDS OF THE VÌDÀÀ AND THE DANTA-ÀÀ KU DENTAL PINCERS; ARE A LITTLE BENT DOWN AND THEIR FACES ARE MADE TO RESEMBLE SHARP THORNS, OR THE NEWLY SPROUTED LEAVES OF A BARLEY PLANT, THE TOP END OF AN EÀÀ, I CLOSELY RESEMBLES THE MOUTH OF AN EARTH WORM. THE LENGTH OF A MUDRIKA SHOULD BE MADE EQUAL TO
THAT OF THE TOP PHALANGES OF THE INDEX FINGER
(OF A MAN OF AVERAGE HEIGHT.) A āRāRIMUKHA
MEASURES TEN FINGERS IN LENGTH. THE REST OF THE
INSTRUMENTS ARE MOSTLY MADE TO MEASURE SIX
FINGERS IN LENGTH.

FEATURES IN A SURGICAL INSTRUMENT

INSTRUMENTS THAT ARE FITTED WITH HANDLES
OF EASY GRIP AND ARE MADE OF GOOD AND PURE
IRON, WELL SHAPED, SHARP, ARE SET WITH EDGES
THAT ARE NOT JAGGED AND END IN WELL FORMED
POINTS OR TOPS, SHOULD BE DEEMED AS THE BEST OF
THEIR KIND.

CURVATURE, BLUNTNESS ; KUNTA-IT
INCAPABLE OF CUTTING HAIR, UNEQUAL SHARPNESS
OF THE EDGE, ROUGH-EDGEDNESS, OVER THICKNESS,
OVER THINNESS, OVER LENGTHINESS, AND OVER
SHORTNESS ARE THE DEFECTIVE TRAITS IN A
SURGICAL INSTRUMENT. THOSE POSSESSED OF
CONTRARY FEATURES SHOULD BE USED, BUT A
KARAPATRA SET WITH A VERY ROUGH (DENTATED)
Edge may be used for the purpose of sawing the bones.

A surgical instrument meant (excision or bhedanam) should be set with an edge as thin as that of a Musura pulse lentil seed, while an instrument used in scraping should be set with an edge half as thin as that of the former. An instrument used either in connection with the measures of secretion or cutting by uplifting (vyadhanam) should be set with an edge as fine as the human hair, while an instrument of incision should have an edge half as thin as that of the former.

Surgical instruments should be tempered with one of the three substances such as, alkali, water, and oil. Instruments used in cutting an arrow, a bone, or any foreign matter (salyami) pricked into the human body, should be tempered with alkali, whereas those that are made use of in cutting,
CLEAVING, AND LOPPING OFF THE FLESH FROM AN AFFECTED PART), SHOULD BE TEMPERED WITH WATER. INSTRUMENTS USED IN OPENING (VYADHANAM) A VEIN (SIRA) OR IN CUTTING OPEN A NERVE (SNAYU) SHOULD BE TEMPERED WITH OIL, AND SHOULD BE WHETTED UPON A SPECIES OF STONE-SLAB RESEMBLING A MASHA PULSE IN COLOUR, AND THEIR SET-EDGE SHOULD BE PROTECTED BY PUTTING IT IN A SHEATH MADE OF ÏLMALI WOOD.

AN INSTRUMENT, WELL GROUND, WELL SHAPED, FITTED WITH A CONVENIENT HANDLE AND CAPABLE OF (LATERALLY) CUTTING A HAIR IN TWO AND MADE ACCORDING TO MEASURES LAID DOWN IN THE ÏASTRAS, SHOULD ALONE BE USED IN A SURGICAL OPERATION.


THE FOUR ARTICLES SUCH AS STRIPS OF BAMBOO SKIN, CRYSTALS, BITS OF GLASS, AND THE ROCK KNOWN AS KURUVINDA, SHOULD BE USED BY AN INTELLIGENT PHYSICIAN IN INCISING OR EXCISING BHEDANAMI OPERATIONS, WHERE THE PATIENT WOULD BE FOUND TO HAVE A DREAD OF THE KNIFE, OR TOO YOUNG TO BE SURGICALLY OPERATED UPON WITH IT, OR WHERE THE PROPER INSTRUMENT CANNOT BE PROCURED. THE NAILS OF FINGERS SHOULD BE USED IN OPERATIONS OF INCISING, EXCISING OR EXTRACTING IN (SUBSTITUTION FOR THE INSTRUMENTS ENJOINED TO BE USED FOR THE PURPOSE), WHEN SUCH A COURSE WOULD APPEAR FEASIBLE. THE PROCESSES OF APPLYING ALKALIS, LEECHES AND CAUTERISATION WILL BE DEALT WITH LATER ON.
DISEASES AFFECTING THE EYE LIDS OR THE CAVITY OF THE MOUTH, OPERATIONS FOR THE PURPOSES OF SECRETING OR EVACUATING (THE ACCUMULATED PUS OR PHLEGM;), MAY BE PERFORMED WITH THE LEAVES OF AAKAPATRA, EPH\:LIKA OR GOJIS. IN THE ABSENCE OF A PROBE OR DIRECTOR, SEARCHING MAY BE DONE WITH THE HELP OF A FINGER, OR WITH A HAIR, OR WITH A CORN SPROUT. AN INTELLIGENT PHYSICIAN SHOULD DEEM IT HIS IMPERATIVE DUTY TO GET HIS SURGICAL INSTRUMENTS MADE BY A SKILFUL AND EXPERIENCED BLACKSMITH, AND OF PURE, STRONG AND SHARP IRON STEEL. A PHYSICIAN, SKILLED IN THE ART OF USING SURGICAL INSTRUMENTS, IS ALWAYS SUCCESSFUL IN HIS PROFESSIONAL PRACTICE, AND HENCE THE PRACTICE OF SURGERY SHOULD BE COMMENCED AT THE VERY OUTSET OF MEDICAL STUDIES.

SURGICAL INSTRUMENTS

THE SEVENTH CHAPTER OF SU\:RUTA SAÆHITI, DEALS WITH SURGICAL INSTRUMENTS NUMBER ONE
Hundred and one in all, of which the hand is the most important, in as much as (all of them depend on the hand for their principal auxiliary) and as none of them can be handled without it; and further because all surgical operations pre-eminently require its co-operation.

Any foreign or extraneous substance, which finds a lodgment in the human system and becomes painful to the body and the mind alike, is called a ḫalya; and surgical instruments are the means of extracting it from its seat or place where it is embedded.

Surgical appliances may be divided into six different groups or types, such as the svastika, the sandansha, the tiła, the nadi yantras, and the ḫiḥkas, besides those that are called the minor or accessory appliances (upayāntras).
According to certain authorities hundred is here indefinitely used for a large number into two; the nīyāṇtras tubular into twenty; and the ḫālakas (bougies into twenty eight; while the upāyāṇtras admit of being divided into twenty five different types. These instruments are all made of iron which may be substituted for any other similar or suitable substance where iron would be unavailable.

The mouths of these appliances are usually made to resemble those of birds and beasts, and hence they should be made to resemble the mouths of some particular animal in shape, or otherwise, according to the advice of old and experienced physicians surgeons; or according to the directions as laid down in the āṭstras (medical books of recognised authority, or according to the exigencies of the case, or after the shape and
STRUCTURE OF OTHER APPLIANCES USED ON SIMILAR OCCASIONS.)

APPLIANCES SHOULD BE MADE NEITHER TOO LARGE NOR TOO SMALL, AND THEIR MOUTHS OR EDGES SHOULD BE MADE SHARP AND KEEN. THEY SHOULD BE MADE WITH A SPECIAL EYE AS TO STRENGTH AND STEADINESS, AND THEY SHOULD BE PROVIDED WITH CONVENIENT HANDLES.

SVASTIKA

APPLIANCES OF THE "SVASTIKA" CLASS SHOULD BE MADE TO MEASURE EIGHTEEN FINGERS IN LENGTH; AND THEIR MOUTHS SHOULD BE MADE TO RESEMBLE THOSE OF LIONS, TIGERS, WOLVES, HYENAS, BEARS, CATS, JACKALS, DEER, CROWS, CORMORANTS, KURURAS A SPECIES OF BIRD; HASAS (A SPECIES OF SPARROW, VULTURES, FALCONS, OWLS, KITES, HERONS, BHAGARAJAS (A SPECIES OF BIRD, AMJALIKAS, AVABHAJANAS, XANDIMUKHAS. AND SUCH LIKE BEASTS AND BIRDS. THE TWO BLADES OR HALVES OF A "SVASTIKA" SHOULD BE WELDED
TOGETHER BY MEANS OF A BOLT RESEMBLING A MASURA PULSE LENTIL IN SIZE, AND THE HANDLES SHOULD BE TURNED INWARD IN THE SHAPE OF A MACE, OR AN ANKUSA. APPLIANCES OF THIS TYPE SHOULD BE USED IN EXTRACTING ANY THORN OR FOREIGN MATTER WHICH MAY HAVE ENTERED INTO THE BONES.

THE WORD SVASTIKA IS A TECHNICAL TERM SIGNIFYING ONE OF THE TWENTY FOUR SIGNS OF THE JINAS; AND IT CAN BE REPRESENTED BY TWO LINES CROSSING EACH OTHER, THE ARMS OF THE CROSS BEING BENT AT THEIR EXTREMITIES TOWARDS THE SAME DIRECTION. SO THESE INSTRUMENTS MAY BE DESCRIBED AS CRUCIFORM. THEY HAVE, AS A RULE A LENGTH OF EIGHTEEN AGULÇ. THEIR ENDS SHOULD BE SHAPED LIKE THE FACES OF THE FOLLOWING FEROIOUS BEASTS (1 TO 8), DEER (9) AND BIRDS (10 TO 24), AND THE INSTRUMENTS ARE TO BE CALLED AFTER THEIR NAMES. THEY ARE DIVIDED INTO TWO CLASSES; THE INSTRUMENTS OF

THE HANDLES ARE EITHER ROUNDED OFF, OR BENT AT AN ANGLE AT THEIR ENDS, LIKE AN ELEPHANT DRIVER'S GOAD THE OBJECT BEING TO AFFORD A GOOD GRASP OF THE INSTRUMENT BY THE SURGEON'S HANDS. THE SVÄSTIKA INSTRUMENTS ARE USED FOR THE EXTRACTION OF FOREIGN BODIES IMPACTED IN THE BONES.

SANDANÄËS

SANDANSAS TONGS ARE DIVIDED INTO TWO CLASSES AS THERE ARE SOLDERED TOGETHER WITH OR WITHOUT A BOLT. THEY SHOULD BE MADE TO MEASURE SIXTEEN FINGERS IN LENGTH, AND SHOULD BE USED TO WITHDRAW ANY THORN-LIKE SUBSTANCE FROM BELOW THE SKIN, FLESH, VEINS OR NERVES.
THE FORCEPS ARE WITH AND WITHOUT HANDLES. THE FIRST VARIETY IS LIKENED TO FORCEPS WITH ARMS, USED BY THE BARBERS FOR DEPILATING THE NASAL CAVITIES, WHILE THE SECOND VARIETY IS LIKE THE ARMLESS FORCEPS USED BY THE GOLD SMITHS. THE FORMER CONSISTS OF TWO ARMS JOINED CROSSWISE BY A PIN FIXED AT ABOUT THEIR MIDDLE POINTS, AND SO REALLY IS A CRUCIFORM INSTRUMENT BUT IS CLASSED HERE FOR ITS DIFFERENT USE IN SURGERY. THE FORCEPS WITHOUT HANDLES CONSISTS OF TWO BLADES SOLDERED AT ONE END. THE SANDAMSAS ARE USED FOR THE PURPOSE OF EXTRACTING FOREIGN BODY.

THE SECOND VARIETY IS KNOWN AS THE MUCUTI INSTRUMENTS. IT IS A PAIR OF STRAIGHT FORCEPS, HAVING NO CURVE LIKE THAT OF THE SANDAMSAS. IT IS SERRATED FINELY AT THE OPEN ENDS. THE SOLDERED END HAS A RING ATTACHED TO IT AS ORNAMENTATION. IT IS RECOMMENDED TO BE USED FOR REMOVING PAIRFUL SLOUGHS AND
AROUND GRANULATIONS FROM A DEEP SEATED ABSCESS. IT IS ALSO TO BE USED TO COMPLETE THE OPERATION FOR PTERYGIUM BY REMOVING THE REMNANT, AFTER IT HAS BEEN EXTIRPATED BY THE SHARP INSTRUMENTS.

SUₐRUTA MENTIONS BAMSA BIDALA OR BAMBOO FORCEPS. IT IS MADE OF A PIECE OF BAMBOO ROD, SPLIT LONGITUDINALLY INTO TWO HALVES NEARLY TO ITS WHOLE EXTENT. THE SANDAMSA INSTRUMENT MAY BE COMPARED WITH THE MODERN DRESSING FORCEPS AND WITH (THE FORCEPS STILL USED BY THE GOLD SMITHS).

THE TÉLA YANTRAS

THE TÉLA YANTRAS WHICH MEASURE TWELVE FINGERS IN LENGTH, MAY BE DIVIDED INTO TWO CLASSES AS THE SINGLE TÉLA AND THE DOUBLE TÉLA. THE FORMER RESEMBLE THE SCALES OF FISH IN SHAPE, WHILE THE LATTER, ACCORDING TO CERTAIN AUTHORITIES, ARE MADE TO RESEMBLE THE ENTIRE MOUTH OF A FISH OF THE BHETULI SPECIES.
THESE YANTRAS ARE USED IN EXTRACTING SPLINTERS FROM INSIDE THE NOSE, EARS AND OTHER EXTERNAL CHANNELS OR PASSAGES OF THE BODY.

THE THIRD CLASS OF BLUNT INSTRUMENTS IS CALLED TILA YANTRA. IT HAS A LENGTH OF TWELVE AGULÇ, AND ARE SHAPED LIKE THE JAWS OF A FISH. THEY MAY BE MADE EITHER WITH A SINGLE BLADE (EKATILA) OR WITH DOUBLE BLADES (DViTALa) SOLDERED AT ONE END, THE HOOKED ENDS BEING FREE. THEY ARE INTENDED FOR THE PURPOSE OF EXTRACTING FOREIGN BODIES FROM THE EAR, NOSE AND OTHER OUTER CANALS OF THE BODY. THE EAR SCOOP NOW USED BY THE BARBERS OF INDIA FOR EXTRACTING WAX FROM THE EAR IS A TALA YANTRA.

THE NËDI YANTRAS

THE NöDI YANTRAS TUBULAR INSTRUMENTS LIKE SYRINGE, ENEMAS, ETC. WITH A PASSAGE OR APERTURE RUNNING THROUGH THEIR ENTIRE LENGTH
ARE CONSTRUCTED IN A VARIETY OF SHAPES AND FOR VARIOUS PURPOSES.

SOME OF THEM ARE OPEN AT ONE END, WHILE OTHERS ARE OPEN AT BOTH. THESE INSTRUMENTS ARE USED FOR THE PURPOSE OF EXTRACTING ANY SHALYA THAT HAS PRICKED INTO THE EXTERNAL CANALS OR PASSAGES OF THE BODY, OR FOR INSPECTING THE SEAT OF AFFLICTION AS IN PILES, ETC., OR FOR SUCKING BLOOD, ETC. FROM ANY AFFECTED PART, OR SIMPLY AS ACCESSORIES TO OTHER SURGICAL APPLIANCES. THE LENGTH AND CIRCUMFERENCE OF A NIDI YANTRA SHOULD BE MADE TO COMMENSURATE WITH THOSE OF THE PASSAGE (SROTA) OR OUTLET OF THE HUMAN SYSTEM INTO WHICH IT IS INTENDED TO BE INTRODUCED. WE SHALL DESCRIBE, LATER ON, THE TYPES OF NIDYANTRAS WHICH ARE TO BE USED IN CONNECTION WITH SUCH DISEASES AS FISTULA IN ANO, PILES, ETC. ORIN TUMOURS AND ULCERS, IN MUTRADVIRIDDHI (HYDROCELE) IN NIRUDDHA PRAKASHA (PHIMOSIS),
IN NIRUDDHA GUDA STRICTURE OF THE RECTUM) AND IN ASCITES, AS WELL AS THOSE TO BE USED FOR THE PURPOSE OF INJECTING ANYTHING INTO THE URETHRA, THE BOWELS, THE VAGINA AND THE UTERUS, OR ARE USED IN CONNECTION WITH MEDICATED INHALATION, OR WITH THOSE THAT ARE KNOWN AS THE ALABU YANTRAS (GOURD USED FOR CUPPING).

THE NADI OR TUBULAR INSTRUMENTS ARE DESCRIBED TO BE OF VARIOUS KINDS AND TO SERVE MANY PURPOSES. THEY ARE OPEN EITHER AT ONE OR BOTH ENDS. THESE ARE USED FOR THE EXTRACTION OF FOREIGN SUBSTANCES FROM THE NATURAL OUTLETS OF THE BODY. THEY ARE ALSO RECOMMENDED TO BE USED AS A DIAGNOSTIC APPARATUS FOR INSPECTION OF DISEASES IN THE CANALS. THEY ARE THE MEANS OF SUCKING OUT FLUID DISCHARGES, AS PUS ETC. FROM CAVITIES AND THEY FACILITATE THE PERFORMANCES OF OTHER OPERATIONS.
THE TUBULAR INSTRUMENTS ARE USED FOR FISTULA IN ANO, HAEMORRHIOIDS, TUMOURS, ABScesses, INJECTIONS INTO THE RECTUM, VAGINA AND URETHRA, HYDROEELS, ASCITES, INHALATIONS, STRICTURE OF URETHRA AND RECTUM AND CUPPING AS BY GOURD AND HORNS.

VIGBHAṬA II MENTIONS KANTĀALȲVALOKIN̄ OR THROAT SPECULAM, PAµCAMUKHA, TRIMUKHA, INSTRUMENT FOR INSPECT ARROWS, INSTRUMENT FOR EXAMINE PILES, FISTULA, INSTRUMENT FOR EXAMINATION OF NASAL DISEASES. THE A´GUL̄ TRANAKA OR FINGER GUARD, JONI VRA, EKĀA, A OR VAGINAL SPECULUM ARE ALSO DESCRIBED BY HIM.

TUBULAR INSTRUMENTS FOR ASCITLS ARE CALLED DAKODARE YANTRA OR CANULA. IT MAY BE EITHER METALLIC OR MANUFACTURED FROM THE CYLINDRICAL HOLLOW CALAMUS OR A PEACOCK'S FEATHER. THE TUBE IS OPEN AT BOTH ENDS AND IS OR THE SAME CALIBRE THROUGHOUT.

THE INSTRUMENTS FOR HYDROCELE
PRACTICALLY THE SAME INSTRUMENT LIKE CANULA. SURUTA MENTIONS A TUBE OR CANULA IS USED TO DRAIN THE FLUID AFTER TAPPING THE HYDROCELE WITH THE VRIHIMUKHA SAASTRA OR TROCAR.

TUBULAR INSTRUMENTS FOR URETHRALL STRICTURE BY MEANS OF TUBES MADE OF IRON, OR WOOD, OR LAC, MUST BE WELL SMEARED WITH GHEE. TUBULAR INSTRUMENTS FOR GRADUAL DIALATATION OF STRICTURE OF RECTUM USING A HIGHER NUMBER OR DILATORS AFTER THE LAPSE OR THREE DAYS UNTIL THE DESIRED EFFECTS ARE ATTAINED.

INJECTIONS INTO THE RECTO ARE TO BE THROWN BY MEANS OF A TUBE WITH A MEMBRANOUS BASE TIED TO ITS END, THE INSTRUMENT IS KNOWN AS THE VASTI YANTRA OR RECTAL CLYSTER. THE TUBE IS ADVISED TO BE MADE EITHER OF GOLD, OR SILVER, OR LEAD, OR COPPER, OR BRASS, OR BELL-METAL, OR IVORY OR HORNs, OR GLASS OR PRECIOUS STONES, OR WOOD OR BAMBOO. IT SHOULD
BE CLEAN, SMOOTH, STRONG, AND TAPERING LIKE A COW'S TAIL, AND SHOULD TERMINATE IN A SMOOTH ROUNDED BULB. THE TUBE VARIES IN LENGTH AND CIRCUMFERENCE ACCORDING TO THE AGE OF THE PATIENT.

UTTARA-VASTI

TUBULAR INSTRUMENTS FOR THE UREThRA

THE TUBES INTENDED FOR APPLYING MEDICINES INTO THE MALE UREThRA IS RECOMMENDED TO BE TWELVE A’GUL€ LONG. IT IS TO BE MADE OF GOLD AND IS CALLED PUÅPÅNETRA. ITS CIRCUMFERENCE IS EQUAL TO THAT OF STALK OR FLOWER OR JAN (JASMIMUM GRADIFLORUM) OR MÌLAT€ (ECHITES CIAYØPHYLLATA, ROX.), AND THE LUMEM OR THE TUBE ALLOWS A MUSTARD SEED TO PASS THROUGH IT. IT IS PROVIDED WITH AN ANNULAR PROJECTION JUST AT THE CENTRAL PART.

TUBULAR INSTRUMENTS FOR THE VAGINA

THE VAGINAL TUBE SHOULD BE THICKER THAN THE URETHRAL TUBE AND IN CIRCUMFERENCE
SHOULD BE EQUAL TO THAT OF (THE LITTLE FINGER).
IT SHOULD BE INTRODUCED INTO THE VAGINAL CANAL
UP TO A DISTANCE OF FOUR A´GULÇ. WHEREAS INTO
THE URETHRA, THE TUBE WAS ALLOWED TO ENTER
UP TO A DISTANCE OF TWO A´GULÇ ONLY IN THE
ADULTS AND OF ONE A´GULÇ ONLY IN THE GIRLS.

THE UTERINE TUBES

THE UTTARA VASTI COMPRISSES THE URETHRAL
SYRINGE MALE, FEMALE, THE VAGINAL AND UTERINE
CLYSTERS.

TUBULAR INSTRUMENTS FOR INHALATIONS

AND FUMIGATIONS

THE TUBES FOR SMOKING WERE MADE, LIKE THE
VASTI TUBES, OF VARIOUS METALS, OR GLASS OR
WOOD. CARAKA DESCRIBES IT AS A STRAIGHT TUBE
HAVING POUCHES. THE END OF THE TUBE IS EQUAL IN
DIAMETER TO THAT OF A PLUM SEED.
SARNGADHARA SAYS THAT A REED OR BAMBOO PIPE
WILL ALSO SERVE THE PURPOSE. IT IS DESCRIBED AS
A STRAIGHT TUBE, THE BROAD BASE OF WHICH

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ADmits the patient's thumb while the narrow end, a plain seed. Suãruta describes the base and end of the tube to be equal in circumference to that of the thumb and little finger respectively.

FUMIGATION

In the purification of wounds by fumigation, Suãruta recommends the tube to be eight A'Gulç long and to have the circumference of a common pea, and its orific should be the size of a KulaTTHa (Dolichos biflorus, Linn). The fumes of medicated substances from the inside of any closed pot containing fire, pass out through the tube and are allowed to play on any sore to purify it. For this purpose two earthen pots Soraba SampuTa may conveniently be used as before. Sarngadhara describes a tube size ten A'Gulç long and recommends to use Nimba leaves for wound fumigation.
DISINFECTION ROOMS CLOTHES.

CARAKA SAYS THAT IF PEACOCK'S FEATHER, BONES OF VĀKA BIRD, WHITE MUSTARD AND RED SANDAL WOOD, WELL POWDERED AND MIXED WITH GHEE. BE USED IN FUMIGATION, TO GET RID OF THE POISON OF A ROOM, BEDDING, SEATS AND CLOTHES. SARNGADHARA ADVISES US TO DISINFECT A SICK ROOM BY THE FUMES CAUSED BY BURNING THE FOLLOWING SUBSTANCES WITH GHEE.

PEACOCK'S FEATHER, NIM LEAVES (MELIA AZADIRACHTA), VRIHATI, PEPPER, ASAFOETIDA, JOTAMAMSI (NARDOSTACHYS JOTAMANSI), SEEDS OF SīLMALI (BOMBAX MALABARIEUM), GOAT'S HAIR, SLOUGH OF A SERPENT, CAT'S FAECES AND IVORY. SÙRUTA ADVISES FUMIGATION OF A SICK ROOM FOR A SURGICAL PATIENT FOR TEN DAYS, MORNING AND EVENING, AFTER THE OPERATION HAS BEEN PERFORMED.

TUBULAR INSTRUMENT FOR CUPPING

GENERALLY COW'S HORN IS RECOMMENDED FOR
THE PURPOSE. IT IS EIGHTEEN A´GUL¢ LONG, ITS BASE, FORMING THE MOUTH OF THE INSTRUMENT, IS THREE A´GUL¢ WIDE. IT IS CONICAL IN SHAPE AND THE CONE IS SAID TO BE EITHER CURVED OR STRAIGHT. THE OTHER END IS POINTED AND PERFORATED TO THE EXTENT OF ALLOWING A MUSTARD SEED TO PASS THROUGH IT. THE NARROW END, HOWEVER, IS MADE TO ASSUME THE SHAPE OF A WOMAN'S NIPPLE BY WINDING THREAD ROUND IT. THIS FACILITATES THE OPERATION OF SUCTION BY THE MOUTH OF A SURGEON WHEN THE BROAD END IS PLACED AGAINST ANY DISEASED AREA OF THE PATIENT'S BODY. SU¿RUTA MENTIONS ITS USE IN BLOOD EXTRACTION.

ALËBU YANTRA

ALëBU OR GOurd IS DESCRIBED TO BE MADE OF THE BARK OF THE SUCCULENT FRUIT CALLED ALëBU (LAGENAREA VULGARIS). THE PULP IS SCRAPED AWAY AND THE BARK IS ALLOWED TO DRY. SUCH A BARK SHOULD BE SELECTED WHICH IS TWELVE AND
EIGHTEEN A´GUL¢ IN LENGTH AND CIRCUMFERENCE RESPECTIVELY. ITS MOUTH SHOULD BE CIRCULAR AND SHOULD HAVE A DIAMETER OF THREE OF FOUR A´GUL¢. A FIRE IS TO BE LIT INSIDE IT BY BURNING A STRIP OF DRY CLOTH TO PRODUCE A VACUUM, AND THE INSTRUMENT TO BE APPLIED INSTANTLY TO THE INTENDED PART OF THE PATIENT'S BODY, IT SHOULD BE THUS USED TO DRAIN BLOOD AND PHLEGM FROM THE BODY. CARAKA MENTIONS THE USE OF ALiBU FOR BLOOD EXTRACTION.

ANOTHER INSTRUMENT KNOWN AS THE GHA¶¢YANTRA WAS USED EXACTLY IN THE SAME WAY, IT IS SAID TO CONSIST OF A BRASS POT WHICH IS STILL USED COMMONLY IN INDIA BY ALL CLASSES OF PEOPLE FOR DRINKING PURPOSES.

THE SALËKË YANTRAS

THE A¯LIKA YANTRAS BOUGIES ARE OF VARIOUS SHAPES AND SERVE A VARIETY OF PURPOSES. THE LENGTHS AND GIRTHS OF THESE INSTRUMENTS SHOULD BE DETERMINED ACCORDING TO
THE NECESSITY OF EACH INDIVIDUAL CASE. FOUR PROBES OR DIRECTORS ܩALIKA IN TWO PAIRS, ARE USED FOR THE PURPOSES OF SEARCHING ӔA, A PUS IN A SUPPURATED PART OR LIMB, OR IN CONNECTION WITH UPLIFTING, CUTTING AND THEREBY WITHDRAWING A ܩALYÀ FROM THE PART IT HAS PRICKED INTO, OR WITH A VIEW TO TRANSFER SUCH A BODY FROM ONE PLACE TO ANOTHER .�ALANAM, OR FOR THE PURPOSE OF EXTRACTING IT ܩALYÀ FROM THE AFFECTED PART. THE MOUTHS OF THE TWO TYPES OF THESE DIRECTORS RESPECTIVELY RESEMBLE THOSE OF A GA,UPADA EARTHWORM AND OF A ܩARAPUˊKA TEPHROSIA PURPUREA, PERS WHILE THE OTHER TWO ARE RESPECTIVELY HEADED LIKE THE HOOD OF A SERPENT AND A FISH HOOK. A COUPLE OF DIRECTORS ARE USED FOR THE PURPOSE OF WITHDRAWING A FOREIGN MATTER ܩALYÀ IMBEDDED IN ANY OUTER CANAL OF THE BODY SROTAS. THE TOP ENDS OF THESE DIRECTORS ARE BENT DOWN A LITTLE, AND THEY RESEMBLE A LENTIL SEED IN SIZE. SIX
TYPES OF DIRECTORS OR PROBES ARE USED IN CLEANSING THE PUS FROM AN AFFECTED PART OF THE HUMAN ORGANISM AND THEIR TOP ENDS ARE FITTED WITH CAPS OF LOOSE COTTON. THE THREE SORTS OF DIRECTORS USED IN APPLYING ALKALINE MEDICINES, ARE SHAPED LIKE LADLES, AND THEIR MOUTHS RESEMBLE THE CAVITIES OF LITTLE STONE MORTARS (*KHALA*.)

OF THE SIX SORTS OF DIRECTORS USED IN CONNECTION WITH THE PROCESS OF CAUTERISATION (*AGNIKARMA*) THREE ARE MOUTHED LIKE THE JAMBOLINE FRUIT, WHILE THE OTHER THREE ARE FACED LIKE A MACE OR A SPEAR (*ANKISHA* - A KIND OF DIRECTOR USED IN REMOVING NASAL TUMOURS, IS MOUTHED LIKE THE HALF OF THE KERNEL FOUND IN THE INSIDE OF A JUJUBE-STPNE, WITH A LITTLE DIP IN THE MIDDLE, ITS LIP OR END HAVING A KEEN OR SHARP EDGE. THE ENDS OF THE TYPE OF PROBE USED IN APPLYING *AUNAMARS* MEDICATED COLLYRIA TO THE EYELIDS ARE WROUGHT INTO TWO SMALL ROUND
LOBES LIKE THE MATARÅ PULSE AND ARE BLUNTRED, WHILE THE SORT OF PROBE USED IN CLEANSING THE URETHRA, IS MADE ROUND LIKE THE END OF THE STEM OF A MİLATÊ FLOWER.

THE RODS, OR PRICKER LIKE INSTRUMENTS, OR PROBES ARE DESCRIBED TO BE OF VARIOUS KINDS AND ARE RECOMMENDED TO BE USED FOR VARIOUS PURPOSES. THERE ARE TWO KINDS OF ÇALİKİ WITH THEIR ENDS SHAPED LIKE THE HEAD OF THE EARTHWORM. THEY ARE USED FOR PROBING ABSCESSES AND SINUSES.

TWO ÇALİKİ HAVE THEIR ENDS SHAPED LIKE THE HOOD OF A SNAKE. THEY ARE USEFUL FOR TRANSFERRING ANY MATERIAL FROM ONE PART TO ANOTHER. TWO ÇALİKİ HAVE THEIR ENDS SHAPED LIKE FISH HOOK BUT ARE BLUNT. THEY ARE USED FOR EXTRACTING ANY EXTRANEOUS MATERIAL FROM THE MUSCLES OR BONES.

THE LAST SIX KINDS PROBES OF SUÇRUTA ARE PRACTICALLY THE SAME AS THE SIX ÇA´KU OF
SWAB PROBES


SPOON SHAPED PROBES

THREE PROBES ARE DESCRIBED TO HAVE THEIR ENDS SHAPED LIKE A KHALA OR MORTAR WITH A CONICAL CAVITY AND SO THEY RESEMBLE A SPOON. THEY ARE TO BE USED FOR THE PURPOSE OF APPLYING CAUSTIC SOLUTIONS ETC.

NAIL-SHAPED PROBES

VĪGBHAṬA DESCRIBES THREE OTHER PROBES FOR THE SAME PURPOSE. THEY ARE EIGHT AGULC LONG; THEIR ENDS ARE BENT AND RESEMBLE IN SIZE
AND SHAPE THE NAILS OF THE THIRD, FOURTH, AND FIFTH FINGERS RESPECTIVELY.

**JAMVOVAUSTHA PROBES**

THREE PROBES ARE CALLED JAMVOVAUSTHA FOR THEIR ENDS ARE SHAPED LIKE THE FRUIT OF JAMBUL TREE (EUGENIA JAMBOLANUM). THREE OTHER \( \text{ALiK}_i \) HAVE THEIR ENDS SHAPED LIKE A \( \text{KU}_\text{A} \) OR ELEPHANT DRIVER'S GOAD. THEY MAY BE MADE OF ANY LENGTH REQUIRED BY THE SURGEON. THESE SIX VARIETIES ARE RECOMMENDED FOR THE PURPOSE OF APPLYING CAUSTIC MEDICAMENTS AND THE ACTUAL CAUTERY.

**COLLYRIUM PROBES**

TO APPLY COLLYRIA TO THE EYES, A ROD IS MENTIONED HAVING THE LENGTH OF EIGHT \( \text{A'GUL}_\text{G} \) AND THE THICKNESS OF A PEA. ITS BOTH ENDS ARE SHAPED LIKE BUDS. THE PROBES FOR APPLYING COLLYRIA TO THE EYELIDS, SHOULD BE SIX \( \text{A'GUL}_\text{G} \) LONG, WITH A ROUNDED BULBOUS END. THEY MAY BE MADE OF GOLD OR SILVER, OR COPPER, OR IRON, OR
STONE. FOR THE HABITUAL USE OF COLLYRIA, A LEAD PROBE IS PRESCRIBED. WHEN MEDICINES ARE DIRECTED TO BE APPLIED NOT ONLY TO THE LIDS BUT ALSO TO (THE CONJUNCTIVE), THE FINGER IS RECOMMENDED AS IT IS A SOFTER AND SAFER INSTRUMENT. AGAIN THE PROBES WOULD VARY ACCORDING TO THE NATURE OF THE COLLYRIA TO BE USED.

**KARŪAAÁO DHANA OR EAR CLEANER**

THIS āALÎKI IS SAID TO HAVE ITS END SHAPED LIKE THE ENDS OF A LEAF OF ASVÂTHA (FICUS RELIGIOSE). THE INSTRUMENT LOOKED LIKE A SRUVA ONE OF THE FAMOUS SPOONS USED IN SACRIFICIAL CEREMONY. IT WAS USED FOR THE PURPOSE OF EXTRACTING WAX FROM THE EARS.

**GARBHA ÁA×KU FOETUS OF TRACTION HOOK**

THE END OF THIS INSTRUMENT IS SAID TO HAVE BEEN BENT LIKE ā KU₂Ā OR ELEPHANT DRIVER'S GOAD. IT IS DESCRIBED TO HAVE THE SAME LENGTH
As the other qā ku have i.e., ten to sixteen a'gul¢, and it is eight a'gul¢ in width. It is recommended for extracting a dead foetus from the mother's womb, after perforating its head by the mā, al ignorance or mudrika knife.

Yujøa āa-ku of midwifery forceps

An instrument is thus named and figured by modern writers on Indian surgery, bearing some resemblance to the modern forceps, for extracting the child alive. We have, however, no mention of any such instrument in the works of caraka, suruta, vibhāta and other ancient authorities.

Sarpa Fana

It is to be used for the purpose of extracting stone after operation. It has a hook and the end being bent like the hood of a snake.

Sarapunkha Mukha Probe

This instrument is also described to have
ITS END BENT LIKE THE HOOD OF SNAKE. IT IS FOUR A´GULÇ LONG AND IS RECOMMENDED TO BE USED FOR THE PURPOSE OF EXTRACTING A TOOTH FROM ITS SOCKET.

ARDHACANDRAMUKHASULA
HALF MOON PROBE

THE FIRST HALF OF THIS VARIETY OF GALA IS CURVED LIKE A HALF-MOON, TO WHICH IS ATTACHED THE SECOND HALF AS A ROUNDED HANDLE. SUəRUTA ADVISES US TO USE IT FOR THE PURPOSE OF APPLYING ACTUAL CAUTERY TO THE GROIN IN BUBONECELE, TO PREVENT THE HERNIA FROM ENTERING INTO THE SCROTUM.

BONE LEVER

INSTRUMENTS FOR LEVERING FRACTURED BONES INTO THEIR PROPER POSITIONS ARE MENTIONED SEVERAL TIMES BY SUəRUTA. IN THE TREATMENT OF FRACTURE OF THE NASAL BONES, A ćALİKİ IS RECOMMENDED TO BE USED AS A BONE LEVER FOR RAISING AND DEPRESSING THE FRACTURED ENDS.
SOMETIMES A MUSALA OR PESTLE IS ADVISED TO BE USED. IT IS A THICK WOODEN PESTLE THE END OF WHICH IS PLAITED WITH IRON. IT IS STILL USED TO STRIKE UPON PADDY TO SEPARATE THE HUSK FROM THE RICE. SÚRUTA MENTIONS ITS USE TO REDUCE DISLOCATIONS OF THE JOINTS OF THE SHOULDER AND NECK.

URETHRAL PROBE

THIS TYPE OF ĀLAKĀ IS DESCRIBED BY SÚRUTA. THE END ROUNDED LIKE THE STALK OF A MÉLATÇ FLOWER (ECHITES CARYOPHYLLATA, ROX.). IT IS TO BE USED FOR CLEANING THE URETHRAL CANAL.

CARAKA MENTIONS A PROBE FOR EXAMINING THE DIRECTION OF THE URETHRAL CANAL AND ITS PATHOLOGICAL CONDITION, BEFORE INTRODUCING THE TUBE OF THE URETHRAL OR BLADDER CYLISIERS INTO IT.

THE UPA-YANTRAS OR MINOR SURGICAL ACCESSORIES

THESE ACCESSORIES SHOULD BE APPLIED TO THE ENTIRE BODY OF A PATIENT, OR TO ANY PART THEREOF SUCH AS, THE ARTERIES, THE VISCERA, OR THE JOINTS, ACCORDING TO THE NECESSITIES OF EACH CASE TO BE DETERMINED BY THE SURGEON.

BY SURGICAL INSTRUMENTS, THE ANCIENTS CONSIDER NOT ONLY THE INSTRUMENTS PROPER, BUT ALSO ANY MECHANICAL AID BY WHICH THE OBJECT OF THE SURGICAL TREATMENT IS
ATTAINED. THUS EVEN MEDICINAL AGENTS ARE
CONSIDERED UNDER THIS HEAD FOR THEY HELP THE
INFLAMMATORY SWELLINGS TO SUBSIDE, OR
SUPPURATE, OR BURST OPEN AS BY VARIOUS
EXTERNAL APPLICATIONS. THE RAJJU OR THREAD
SMEARED WITH CAUSTICS ARE RECOMMENDED BY
SU₂RUTA, KÀ;RASETRAS OR CAUSTIC THREAD FOR
THE OPERATION OF FISTULA IN ANO. THREAD AS A
MATERIAL OF PHALAVARTI OR TENT IS
MENTIONED BY SARNGADHARA.

THE USE OF VE, IKA TWINE AS A LIGATURE TO
BE APPLIED ABOVE THE PART BITTEN BY A SNAKE TO
ARREST THE CIRCULATION OF BLOOD TOWARDS THE
HEART IS MENTIONED BY SU₂RUTA. LATTA OR
BANDAGES ARE MENTIONED DETAILED BY SU₂RUTA.
SU₂RUTA MENTIONS THE FOLLOWING MATERIALS TO BE
NECESSARY: VIZ., CLOTH MANUFACTURED FROM THE
FIBRES OF PLANTS, FLAX, COTTON, WOOL BLANKETS,
SILK, LEATHER ETC. HE DESCRIBES FOURTEEN
VARIETIES OF BANDAGES.
**ABDOMINAL BINDER**

Caraka mentions the use of abdominal binder for the recently delivered woman to prevent dearrangement of air by its expansion in her abdomen.

**FIELDS HOSPITAL**

The cloth is to be used for the construction of tents for the doctors to live in. The wounded in war are to be treated in such tents. The tent of the Surgeon General should be close to that of the King in the battlefield. Small tents are also recommended for applying vapour bath to patients.

**DRESSINGS**

Drdhavala mentions the use of medicated gauzes to be used as sponge by the females. In the Mahavagga we find the use of itch cloth. Cakrapati advises us to tie the ends of the hairs of a patient, by a piece of cloth, before
PERFORMING PHLEBOTOMY ON THE VESSELS OF THE HEAD AND NECK.

CARMA OR LEATHER

THE USE OF LEATHER IN ANCIENT MEDICAL PRACTICE IN INDIA WAS MANIFOLD. STRAPS OR BELTS OF LEATHER WERE USED AS BANDAGES. SūRUTA ADVISES US TO APPLY THE LEATHER BANDAGE IN CASES WHERE MORE THAN HALF THE THICKNESS OF THE UPPER OR LOWER EXTREMITIES ARE CUT BY SOME SHARP INSTRUMENTS IN A SLANTING DIRECTION.

IN THE TREATMENT OF SNAKE BITE, A LEATHER LIGATURE IS ADVISED TO BE USED ABOVE THE SEAT OF INJURY TO STOP THE CIRCULATION OF POISONED BLOOD. THIS LIGATURE TO BE MADE OF LEATHER, OR BRAIDED FIBRES OF TREES, OR SOFT CORD OF JUTE ETC.

YANTRA SATAKA

LITHOTOMY STRAP OR BINDING APPARATUS

THIS IS THE NAME OF THE LEATHER SHACKLE.
WHICH IS RECOMMENDED TO BE USED DURING THE 
OPERATION FOR STONE IN THE BLADDER. THE 
PATIENT SHOULD FLEX HIS KNEES AND ELBOWS; 
AND THE PARTS ARE TO BE TIED TOGETHER BY THIS 
INSTRUMENT. SIMILARLY, IT IS TO BE USED DURING 
THE OPERATION FOR PILES. YANTRA KIRAKA IS 
ALSO TO BE USED DURING THE OPERATION OF 
PHLEBOTOMY.

ABDOMINAL BINDER

LEATHER BINDER IS TO BE USED AFTER THE 
OPERATION OF PARACENTESIS ABDONIFINS TO APPLY 
PRESSURE OVER THE ABDOMEN. AFTER DRAINING 
THE FLUID OF ASCITES, THE ABDOMEN OF THE 
PATIENT SHOULD BE WELL WRAPPED WITH 
BLANKETS, OR SILK CLOTH, OR LEATHER BINDER, 
FOR THEN THE ABDOMEN WOULD NOT BE 
FLATULENTLY DISTENDED BY AIR.

ÁIRO VASTI

IN ÁIRO VASTI LEATHER BAGS ARE USED. FOR 
APPLICATION OF OIL ON THE HEAD, USE A GOAT'S
BLADDER FILLED WITH MEDICATED OIL, JUST IN THE SAME WAY AS ICE BAGS ARE USED NOWADAYS. SARNGADHARA DESCRIBES ANOTHER VARIETY. CAKRADATTA ALSO MENTIONS IT.

IN PHLEBOTOMY, A LEATHER BAND IS ADVISED TO BE APPLIED ABOVE THE SPOT WHERE THE VEIN IS TO BE PUNCTURED. THIS BAND IS RECOMMENDED TO BE MADE OF CLOTH, OR JUTE, OR LEATHER, OR BARKS OF TREES ETC. LEATHER WAS ALSO USED IN THE MANUFACTURE OF BOTTLES AND JARS. LEATHER MASAKA FOR HONEY, SOMA JUICE, AND DADHI (CURDLED MILK), IS MENTIONED IN THE İGVEDA AND ALSO IN THE LAWS OF MANU WHERE IT IS CALLED DRTI.

ANTARVALKALA THE INNER BARKS OF TREES

BARKS OF TREES USED AS SPLINTS FOR THE SUPPORT OF FRACTURED BONES. IN FRACTURES OF BONES OF THE FOOT, LEG AND THIGH, SU₂RUTA DIRECTS US TO USE SPLINTS MADE OF BARKS OF TREES TO SURROUND THE LIMBS.
THE CRUTCHES

The use of the sound limb as a splint of support for the fractured bone of the opposite side was well known. Wooden splints resembling in shape the injured member are also recommended. Suṣruta says that if the hand be hacatured, it is to be tied with the opposite hand, but in fractures of both the hands, Gayadasa recommends a wooden hand to be used as a splint for both.

LATA OR CREEPERS

Suṣruta mentioned the tendrils of creepers as material of ligature. He recommends to give a patient, bitten by a snake, ashopeless when he does not respond to the application of stimuli, such as cold water, tendrils of creepers, etc.

Similarly the asthilama is advised to be used for moving arrows fixed in the bone. It is a piece of of stone long and round. The ancients
USED MUDAGRA OR HAMMER OR A PIECE OF STONE TO STRIKE AN ARROW FIRMLY FIXED IN THE BONE.

THE ORGANS.

THE ORGAN OF TASTE AS A MEASURES OF DIAGNOSIS IS NOTED BY STIGMA. SYMPTOMS DISCERNIBLE BY THE SENSE OF TASTE ARE THE VARIOUS TASTES NOTICEABLE IN MORBID SECRETIONS OF URINE AND OTHER DISEASES.

SIMILARLY THE SURGEONS NAIL POSSIBLY HELPED IN THE OPERATION OF CUTTING, PIERCING AND EXTRACTION. THE USE OF MOUTH AS A SUCTION APPARATUS WAS WELL KNOWN TO THE ANCIENTS.

VALA OR HAIR

HORSE HAIR IS TO BE USED FOR APPLYING LIGATURES ROUND THE PILES. IT IS ALSO MATERIAL OF SUTURE FOR THE SKIN. HORSE-HAIR IS ALSO DESCRIBED TO HAVE BEEN USED FOR RAISING PTERYGIUM.

SUHRUTA SAYS THAT WHEN THE ARROW IS
FIRMLY FIXED IN THE BONE AND IF IT CAN NOT BE EXTRACTED BY FORCIBLE PULLING BY HANDS OR INSTRUMENTS, IT SHOULD BE TIED TO THE RING OF A HORSE'S BRIDLE OR Avakataka. ANOTHER METHOD IS TO TIE SUCH AN ARROW BY MEANS OF A ROPE TO THE BRANCH OF A TREE, LOWERED BY PRESSURE.

Ayaskënta or Load Stone

Magnet was known to the ancients and they used it to extract minute foreign bodies such as iron particles from the eyes and teeth. Su্রuta also mentions its use for extracting an arrow from the wound, if it be without barbs. In modern times, a magnet is still used for removing a particle of iron from the eye.

Kāëra: Caustics or Potential Cautery

Caustics were highly extolled by the ancient surgeons as the external applications are better tolerated by the weak and timid persons who are afraid of the
GOAT'S GUT

THE INTESTINES OF THE GOATS ETC. ARE TO BE DRIED AND PREPARED AS MATERIAL OF LIGATURE. THEY SHOULD BE USED IN LIGATURING FINE VESSELS AFTER INCISION BY KNIFE, EVIDENTLY TO CHECK HAEMORRHAGE. Sūrūta enumerates four different ways of arresting haemorrhage after vénésection, namely Sāndhīna, Skandana, Pacana.

THE FUNCTIONS OF SURGICAL INSTRUMENTS

The functions of surgical instruments withdrawing a āllya by moving it to and fro, injection or filling, binding, uplifting, cutting and there by withdrawing a āllya, resetting by means of a twirling motion, removing of a āllya from one place to another, twisting, expanding, pressing, purifying of a passage, drawing off, attracting, bringing to the
SURFACE, UPLIFTING, LOWERING DOWN, APPLYING PRESSURE ALL ROUND A PART, OR AN ORGAN, AGITATING, SUCKING, SEARCHING, CUTTING OR CLEAVING, STRAIGHTENING, WASHING OR FLUSHING, STUFFING THE NOSE AND CLEANSING. THEY NUMBER TWENTY FOUR IN ALL.

THE INTELLIGENT SURGEON SHALL EXERCISE HIS JUDGMENT AND DETERMINE THE NATURE OF THE SURGICAL OPERATION REQUIRED IN EACH INDIVIDUAL CASE, FOR SURELY THE ĀLYĀS REQUIRING A SURGEON'S AID ARE INFINITELY VARIED IN THEIR CHARACTER.

AN APPLIANCE (YANTRA) WHICH IS TOO THICK, OR MADE OF INFERIOR METAL AND HENCE NOT SUBSTANTIALLY MADE, OR TOO SHORT OR TOO LONG, OR DOES NOT ADMIT OF BEING EASILY HANDLED AND IS INCAPABLE OF TAKING IN THE ENTIRE ĀLYĀ, OR IS CURVED, LOOSELY FITTED, OR SOFT-BOLTED, OR LOOSELY TIED UP WITH CORDS, SHOULD NOT BE USED
IN SURGICAL OPERATIONS. THESE ARE THE TWELVE DEFECTS OF A SURGICAL INSTRUMENT.

THE USE OF AN INSTRUMENT DEVOID OF THE ABOVE SAID DEFECTS AND MEASURING EIGHTEEN FINGERS IN LENGTH, IS COMMENDED IN SURGICAL OPERATIONS. ÁALYAS WHICH ARE MANIFEST AND VISIBLE TO THE NAKED EYE, SHOULD BE EXTRACTED WITH THE INSTRUMENTS OF THE SIMHAMUKHA (LION-MOUTHED) TYPE, WHILE THOSE THAT CANNOT BE SEEN, SHOULD BE REMOVED WITH THE HELP OF THE KA KıKAMUKHAS HERON MOUTHEDE INSTRUMENTS, ETC., ACCORDING TO THE DIRECTIONS LAID DOWN IN THE ĀASTRAS MEDICAL OR SURGICAL WORKS OF RECOGNIZED AUTHORITY.

THE KA KıKAMUKHAS ARE THE BEST OF ALL OTHER TYPES OF INSTRUMENTS, IN AS MUCH AS THEY CAN BE INSERTED AND TAKEN OUT WITHOUT THE LEAST DIFFICULTY, ARE CAPABLE OF DRAWING OUT A ÁALYA WITH THE GREATEST EASE, AND ARE
APPLICABLE TO ALL PARTS OF THE HUMAN BODY BE THEY AN ARTERY OR A BONE-JOINT.

RESEMBLANCE

THE DEFECTS OF THE SURGICAL INSTRUMENTS RECOVERED FROM TIME TO TIME CAN BE OBSERVED. FOR NECESSARILY, SO MANY CHANGES OCCURRED IN THE MODELS OF SURGICAL INSTRUMENTS. MANY OF THESE INSTRUMENTS HAD MUCH SIMILARITIES TO THE MODERN SURGICAL INSTRUMENTS THAT ARE USED IN KEYHOLE SURGERY AT PRESENT. THE RESEARCH OF THE RESEMBLANCE OF THESE INSTRUMENTS IS AN INTERESTING SUBJECT. SOME OF THE EXAMPLES ARE GIVEN BELOW.

OLD MODERN

SIÆHAMUKHAM- ESMARCH’S
TOURNIQUET
KA´KAMUKHAM- LAMINECTOMY
FORCEPS
VIMUKTAGRA SAMDAMSA- STRAIGHT
FORCEPS OR DEBACKEY TISSUE FORCEPS
MUCUDI- FORCPS C LOCKS
SAMDAMSA- THUMB FORCPS
EKATHALAKAM- DOYAN'S
RETRACTER
DVITHALAKAM- OVUM FORCPS
ARSOYANTRAM- PROCTOSCOPE.
BHAGANDHARA YANTRAM ANAL
SPECULAM
(EKACHIDRAM)
MAL¡GRAM- LIVERS
DECAPITATION SAW
V¥DHIPATRAM- DESSECTING KNIFE
OR A BP HANDLE
VRIDHIPATRAM CURVED
DESSECTING KNIFE
(NATAGRAHRSVA VAKRAM)
ULPALAPATRAM- SYME'S
AMPUTATION KNIFE
SRINGAYANTRAM- NASOPHARYNGEAL
AIR WAY

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ESHANI- KARMANS CANULA
VYUHANASANGHU- OLDHAM’S
VERTEBRAL HOOK
GARBHA ә A ә KU- SHIRODKARS
CERVICAL CERCLAGE NEEDLE
ASMARYAHARANAM- DOYEN’S
RASPATOMY
KARNASODHANAM- CURETTE
JAMBHAVAUSHTAM- UTERINE
SOUND
әALәKA- SACRAL ROD
BHADISAM- RAMSbotham’s
DECAPITATION KNIFE
KARTARI- MAYO SCISSORS
SEC- ATRAUMATIC,
STRAIGHT CUTTING
MUDGARA- MALLAT OR A HAMMER.
DUMAYANTRAM SARAVAMSPUTAM SPRAYER.
SARPASYAM- MAYO'S MYOMA

HOOK

KU¿APATRAM- AMPUTATION KNIFE

ANTHARMUGHAM- UMBILICAL CORD

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