米娜® 26件套
MINA® 26 piece set
牙科手术工具套装
Mina Implant Surgical Kit

MINA®
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MINA-800/413 Ochsenbein Chisel 牙骨凿


MINA-363/85 Surgical Curette 牙刮匙


MINA-363/88 Surgical Curette 牙刮匙


MINA-382/0 Periosteals Elevators 牙科用分离器


MINA-377/HK4 Periosteals Elevators 牙科用分离器


MINA-01-0701 Adson Forceps 牙科用组织镊


MINA-27-1107 Oral Retractors 口腔拉钩


18-0645 Scalpel Handles 牙科种植用夹持器


MINA-800/272 Caliper 牙科测量尺


MINA-06-0812 Surgical Scissors 11.5cm 牙科用剪


MINA-11-1302 Needle holder 16cm 牙科器械钳


MINA-800/510 Mallet 牙骨锤


MINA-348/4H2 Probe 牙探针


MINA-36-1902 Bone Rongeurs 牙科用咬骨钳

900-1352 Bone Well 牙科骨粉调和用金属容器

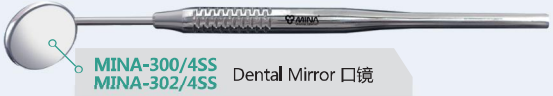

MINA-99-1135 Surgical Scissors 14cm 牙科用剪


MINA-BF439 Towel Clamp 牙科器械钳


MINA-99-1477 Suction Tip 水枪头


MINA-13-0111 Halstead Mosquito 牙科器械钳


MINA-99-1478 Wide Pincette 牙科用镊


MINA-300/4SS
MINA-302/4SS Dental Mirror 口镜


MINA-276/23 Mouth Gags 牙科开口器


MINA-325/13-14 Gracey Curette 牙科用双头探针


MINA-378/0 Periosteal Elevator Prichard 牙科用分离器

18-0103S Scalpel Blade Holder 牙科种植用夹持器


MINA-38-2213 Suction Tubes 190mm 吸唾管

赠送:两块包布和一根水管
Present: 2 pieces of cloth bags and 1 tube

米娜® 18件套
MINA® 18 piece set
牙科手术工具套装
Mina Implant Surgical Kit

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MINA-363/85 Surgical Curette 牙刮匙

MINA-363/88 Surgical Curette 牙刮匙

MINA-382/0 Periosteals Elevators 牙科用分离器

MINA-377/HK4 Periosteals Elevators 牙科用分离器

MINA-01-0701 Adson Forceps 牙科用组织镊

MINA-27-1107 Oral Retractors 口腔拉钩

18-0645 Scalpel Handles 牙科种植用夹持器

MINA-06-0812 Surgical Scissors 11.5cm 牙科用剪

MINA-11-1302 Needle holder 16cm 牙科器械钳

900-1352 Bone Well 牙科骨粉调和用金属容器

MINA-99-1135 Surgical Scissors 14cm 牙科用剪

MINA-BF439 Towel Clamp 牙科器械钳

MINA-13-0111 Halstead Mosquito 牙科器械钳

MINA-99-1478 Wide Pincette 牙科用镊

MINA-300/4SS
MINA-302/4SS Dental Mirror 口镜

MINA-325/13-14 Gracey Curette 牙科用双头探针

MINA-378/0 Periosteal Elevator Prichard 牙科用分离器

MINA-38-2213 Suction Tubes 190mm 吸唾管

赠送：一块包布
Present: a piece of cloth bag

米娜® 12件套
MINA® 12 piece set
牙科手术工具套装
Mina Implant Surgical Kit

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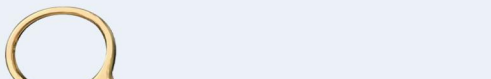
MINA-363/85 Surgical Curette 牙刮匙

MINA-377/HK4 Periosteals Elevators 牙科用分离器

MINA-01-0701 Adson Forceps 牙科用组织镊

MINA-27-1107 Oral Retractors 口腔拉钩



MINA-06-0812 Surgical Scissors 11.5cm 牙科用剪

MINA-11-1302 Needle holder 16cm 牙科器械钳

MINA-38-2213 Suction Tubes 190mm 吸唾管

MINA-BF439 Towel Clamp 牙科器械钳

MINA-13-0111 Halstead Mosquito 牙科器械钳

MINA-300/4SS
MINA-302/4SS Dental Mirror 口镜

MINA-348/4H2 Probe 牙探针

18-0103S Scalpel Blade Holder 牙科种植用夹持器

赠送：一块包布
Present: a piece of cloth bag

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◆米娜®牙科手术工具套装
Mina Implant Surgical Kit

序号	型号	备案名称	通用名称
1	MINA-800/413	牙骨凿	骨凿
2	MINA-363/85	牙刮匙	小刮匙
3	MINA-363/88	牙刮匙	大刮匙
4	MINA-99-1477	水枪头	气头
5	MINA-800/510	牙骨锤	牙骨锤
6	MINA-38-2213	吸唾管	吸唾管
7	MINA-348/4H2	牙探针	牙周探针
8	MINA-27-1107	口腔拉钩	拉钩、种植拉钩
9	MINA-06-0812	牙科用剪	线剪
10	MINA-99-1135	牙科用剪	弯剪
11	MINA-99-1478	牙科用镊	弯钩镊
12	MINA-BF439	牙科器械钳	布巾钳
13	MINA-13-0111	牙科器械钳	掐管器、止血钳
14	MINA-11-1302	牙科器械钳	持针器
15	MINA-276/23	牙科开口器	开口器
16	MINA-800/272	牙科测量尺	测量尺
17	MINA-382/0	牙科用分离器	骨膜分离器大
18	MINA-377/HK4	牙科用分离器	骨膜分离器小
19	MINA-378/0	牙科用分离器	剥离子
20	MINA-01-0701	牙科用组织镊	组织镊
21	MINA-36-1902	牙科用咬骨钳	咬骨钳
22	MINA-325/13-14	牙科用双头探针	双头刮治器
23	MINA-300/4SS	牙科种植用延长器	口镜
	MINA-302/4SS	口镜	
24	18-0103S	牙科种植用夹持器	带刻度手术刀柄
25	18-0645	牙科种植用夹持器	弯手术刀柄
26	900-1352	牙科骨粉调和用金属容器	骨粉碗

牙科手术工具套装外包装
Implant Surgical Instrument Kit Packing

Company Name：Mapleisland Medical Technology (Qingdao) Co., Ltd.
Address：77 Keyun Rd, Hi-tech Zone, Qingdao City, Shandong Prov., China
Postal Code: 266114
Mobile：+86-15308385888
Office Tel: +86-532-80963040
Email ：mapleisland2024@163.com
WS：www.mnmina.com

Made in China

MINA
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产品保养手册

Product Maintenance Manual

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器械篇
Instrument Chapter

米娜手术器械消毒与维护方法
Disinfection and maintenance methods of MINA surgical instruments

口腔手术器械的彻底清洗、严格灭菌和合理维护是手术成功的前提条件，同时也是保持手术器械使用性能的基本要求。（产品为未灭菌提供，在应用于临床手术之前必须灭菌。灭菌项目须由佩戴灭菌手套的专业人员负责。）

Thorough cleaning, strict sterilization, and proper maintenance of oral surgical instruments are the prerequisite conditions for successful surgeries, and they are also the basic requirements for maintaining the performance of surgical instruments. (The product is provided unsterilized, and it must be sterilized before being applied in clinical surgeries. The sterilization items must be in charge of professionals wearing sterilization gloves.)

本手册若有与国家有关规定不一致的，以国家有关规定为准，本手册仅供参考。
If there is any inconsistency between this manual and the relevant national regulations, the relevant national regulations shall prevail, and this manual is for reference only.

首次器械清洁

The first cleaning of the instruments

全新器械在首次使用前，应检查产品是否完整，包括有无生锈、破损等。必须如同使用过的器械一样，先执行一遍完整的清洗、消毒、灭菌处理全过程。因为器械上的残余物，如包装材料或出厂时保留的保养剂可能会造成斑点或硬化层，因此绝对不可省略清洁步骤。

（清洗全过程使用软水）

Before the first use of a brand-new instrument, it should be checked whether the product is complete, including whether there is rust, damage, etc. It must go through a complete process of cleaning, disinfection, and sterilization just like a used instrument. Because residues on the instrument, such as packaging materials or maintenance agents retained during manufacture, may cause spots or hardened layers, the cleaning step must not be omitted absolutely.

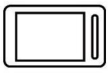
(Use soft water throughout the cleaning process.)

清洗 Cleaning

使用清洗机清洗，检查清洗机的清洗剂泵、管是否通畅，清洗机内壁干净的情况下进行清洗，确保铰链器械彻底打开，防止清洗不彻底。

Use a cleaning machine for cleaning, check whether the cleaning agent pump and pipe of the cleaning machine are unobstructed, and carry out cleaning when the inner wall of the cleaning machine is clean, to ensure that the hinged instruments are completely opened to prevent incomplete cleaning.

干燥 Dry



干燥方式首选机械干燥方式，如干燥箱烘干温度可设定在 40℃ –90℃，也可使用压缩空气吹干。

The preferred drying method is mechanical drying. For example, the drying temperature in the drying oven can be set at 40° C to 90° C, or compressed air can be used to blow dry.

保养 Maintenance

将保养剂适当涂抹到如夹钳、剪刀、持针器等器械的铰接处、末端、螺纹处或滑动面等特定部位，以避免金属间发生摩擦，从而预防摩擦锈蚀发生，保持器械功能正常使用。

Appropriately apply the maintenance agent to specific parts such as the hinge, end, thread, or sliding surface of instruments such as forceps, scissors, and needle holders, to avoid metal-to-metal friction, thereby preventing frictional rust and maintaining the normal function of the instruments.

灭菌 Sterilization

耐热、耐湿的口腔器械首先选择压力蒸汽灭菌的方式进行灭菌。灭菌器应使用去离子水或蒸馏水，其蒸汽质量必须符合要求。使用消毒袋密封，在避光、干燥、干净的区域中室温保存。

For heat-resistant and moisture-resistant oral instruments, pressure steam sterilization is the first choice for sterilization. Deionized water or distilled water should be used in the sterilizer, and the quality of the steam must meet the requirements. Use a disinfection bag to seal and store it at room temperature in a dark, dry, and clean area.

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日常器械保养

Daily instrument maintenance

01

手术器械清洗：

手术后应立即将有污染物的器械在500mg/L 含氯消毒液中浸泡 10 分钟。

使用软毛刷在酶液中仔细刷洗工具，带管腔的器械用粗细合适的刷子刷洗管腔内径，有中空的器械用金属通针疏通引管腔内部，再使用注射器冲洗干净。

Surgical instrument cleaning:
After the operation, the contaminated instruments should be immediately soaked in 500 mg/L chlorine-containing disinfectant solution for 10 minutes.
Use a soft brush to carefully scrub the tools in the enzyme solution, and for instruments with lumens, use a brush of appropriate thickness to scrub the inner diameter of the lumen. For hollow instruments, use a metal stylet to unclog the inside of the lumen, and then use a syringe to rinse it clean.

02

超声清洗机清洗：

在超声清洗机中使用 40℃ -42℃水温加热清洗 20 分钟，在流水下冲洗干净，最后用去离子水漂洗，有效避免氯化物引起的锈蚀和在器械表面产生污渍发生变色。

铰链器械在张开状态下清洗，灭菌时仅卡上第一个棘齿。

Ultrasonic cleaning machine cleaning:
Clean for 20 minutes in an ultrasonic cleaning machine with a water temperature of 40 ° C to 42 ° C, rinse it clean under running water, and finally rinse it with deionized water to effectively prevent rust caused by chlorides and discoloration due to stains on the instrument surface.
Hinged instruments are cleaned in the open state, and only the first ratchet is engaged during sterilization.

03

干燥养护、灭菌：

器械清洗后，检查其洁净度和锋利度，用专用润滑剂养护器械，润滑剂均匀涂抹在闭合器械关节部位。保养后如有过多润滑剂，用无绒的软布拭去，避免润滑剂在关节部位集聚导致关节卡顿。

清点完整后将其依次放回器械盒的对应位置上，放入烘箱烘干。

干燥后放入灭菌指示剂，分类打包。进行真空压力蒸汽灭菌（134℃，15 分钟）。

Drying, maintenance, and sterilization:
After cleaning the instruments, check their cleanliness and sharpness, and maintain the instruments with special lubricant, and evenly apply the lubricant on the joint parts of the closed instruments. If there is too much lubricant after maintenance, wipe it off with a lint-free soft cloth to avoid the accumulation of lubricant at the joint parts causing the joint to jam.

After counting and completing, put them back in the corresponding positions in the instrument box in turn and put them in the oven for drying.
After drying, put in the sterilization indicator, and pack them in categories. Carry out vacuum pressure steam sterilization (134° C, 15 minutes).

04

正确储存：

储存在不良条件下的器械会发生锈蚀。为防止发生这种情况，应将器械储存于干燥、无尘、密闭的无菌柜中。避免较大的温度波动，以避免器械表面湿气（冷凝水）聚集。

化学品直接接触金属器械或放散出腐蚀性挥发气体均可能损坏器械。因此，切勿将器械存放在化学品附近！

Proper storage:
Instruments stored under poor conditions will rust. To prevent this from happening, the instruments should be stored in a dry, dust-free, and sealed sterile cabinet. Avoid large temperature fluctuations to avoid the accumulation of moisture (condensate) on the instrument surface.
The direct contact of chemicals with metal instruments or the emission of corrosive volatile gases may damage the instruments. Therefore, never store the instruments near chemicals!

手术器械使用注意事项

Attention in the use of surgical instruments

1. 术中使用过的器械应及时使用医用清洗剂（中性清洗剂）清洗，禁用含次氯酸钠消毒液清洁，防止血液及组织液的凝结。不能及时清洗的放入多酶洗液中浸泡 10 分钟后，使用蒸馏水清洁、医用酒精消毒，消毒袋密封，在避光、干燥、干净的区域中室温保存。

2. 手术台上未使用的器械，视同污染，必须进行清洗，器械专用器械盒也须清洗。

3. 清洗手术器械时，组合器械（如棘轮扳手等）应拆卸成单一部件进行清洗。使用无绒的软布擦拭器械上的水分或正常晾干，若器械表面有水印，可用医用棉球或干燥的棉布擦拭。

4. 手术完成后，清洗器械前应及时清点器械，避免遗漏或丢失。

5. 清洗消毒过程中，不能和已经生锈的器械放在一起，避免交叉感染。

6. 使用前要注意灭菌的有效期。

1. Instruments used during the operation should be promptly cleaned with medical cleaning agents (neutral cleaning agents), and the use of sodium hypochlorite disinfectant is prohibited to prevent the coagulation of blood and tissue fluid. Those that cannot be cleaned in time should be soaked in multi-enzyme cleaning solution for 10 minutes, then cleaned with distilled water and disinfected with medical alcohol, sealed in a disinfection bag, and stored at room temperature in a dark, dry, and clean area.

2. Instruments not used on the operating table are regarded as contaminated and must be cleaned, and the special instrument box for the instruments must also be cleaned.

3. When cleaning surgical instruments, combined instruments (such as ratchet wrenches, etc.) should be disassembled into individual components for cleaning. Use a lint-free soft cloth to wipe the moisture on the instruments or air dry normally. If there are watermarks on the instrument surface, you can use medical cotton balls or dry cotton cloth to wipe.

4. After the operation is completed, the instruments should be promptly counted before cleaning to avoid omissions or losses.

5. During the cleaning and disinfection process, do not place them together with rusty instruments to avoid cross-infection.

6. Pay attention to the validity period of sterilization before use.

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钻头篇
Drill Chapter

米娜钻头清洗与维护方法
Methods for cleaning and maintaining Mina drill

首次拿到钻头工具时，请务必在使用前对工具盒及钻头进行彻底的清洁、消毒及灭菌等处理。每次使用前都应保证工具盒及钻头的无菌状态。（产品为未灭菌提供，在应用于临床手术之前必须灭菌。灭菌项目须由佩戴灭菌手套的专业人员负责。）

When you first obtain the drill bit tool, be sure to thoroughly clean, disinfect and sterilize the tool box and the drill bit before using it. The aseptic state of the tool box and the drill bit should be ensured before each use. (The product is provided without sterilization, and it must be sterilized before being applied in clinical operations. The sterilization items must be handled by professional personnel wearing sterilization gloves.)

钻头的清洁及维护
Cleaning and maintenance of the drill

01 清洗前预处理
Preprocessing before cleaning

使用过的钻头宜保湿放置，手术中：保湿液可选择生理盐水，术后清洗前：保湿液可选择“蒸馏水或酶类清洁剂”。

清洗前对有污染物的工具采用 500mg/L 有效氯消毒液浸泡 10 分钟以上消毒。

注：污染物干枯会增加工具清洗难度，不宜直接清洗，可以采用浸泡来消化污染物附着力。

The used drill bit should be placed with moisture retention. During the operation: normal saline can be selected as the moisturizing liquid. Before cleaning after the operation: distilled water or enzyme cleaners can be selected as the moisturizing liquid.

Before cleaning, tools with pollutants should be soaked in a disinfectant solution with 500 mg/L available chlorine for more than 10 minutes for disinfection.

Note: Drying of pollutants will increase the difficulty of tool cleaning, and it is not suitable to clean directly. Soaking can be used to digest the adhesion of pollutants.

02 手工 / 超声彻底清洗
Manual/ultrasonic thorough cleaning

钻头放入超声震荡清洗剂中震荡 10 分钟，去除表面及管腔碎屑，钻头间应避免相互碰撞发生磨损。震荡完毕后将钻头取出，冲洗后用气枪吹干。

钻头工具盒的清洗也很重要，仔细清洁每个钻头的胶皮插孔，可以用细棉签沾酒精擦拭。清洁完毕后气枪充分吹干胶皮孔，以免钻头插入后生锈。

注：扩孔钻及其他工具长期保存在橡皮圈中，易被灭菌时产生的水蒸气腐蚀，所以手术过程中没有用的工具也一定要取出来一起清洗。

The drill bit is placed in the ultrasonic oscillation cleaning agent and oscillated for 10 minutes to remove debris on the surface and in the lumen, and the drill bits should avoid colliding with each other to avoid wear. After the oscillation, the drill bit is taken out, rinsed, and blown dry with an air gun.

The cleaning of the drill bit tool box is also very important. Carefully clean each rubber hole of the drill bit, and you can use a thin cotton swab dipped in alcohol to wipe. After cleaning, the rubber hole is fully blown dry with an air gun to prevent rusting after the drill bit is inserted.

Note: The reamer and other tools are easily corroded by the water vapor generated during sterilization when they are kept in the rubber ring for a long time, so the tools that are not used in the operation must also be taken out for cleaning together.

钻头的清洁及维护
Cleaning and maintenance of the drill

03 清洗后消毒
Disinfection after cleaning

化学消毒可采用 70%-80% 的乙醇、酸性氧化电位水或其他消毒剂。将待消毒工具置于乙醇溶液中消毒≥ 30min。或者采用含 500mg/L 有效氯消毒液浸泡 >10min 消毒。

注：消毒前应将附着在工具上的污物蛋白质清洗干净，以免蛋白质凝固变性，增加清洗难度。

Chemical disinfection can adopt 70%-80% ethanol, acidic electrolyzed oxidizing water or other disinfectants. Place the tools to be disinfected in an ethanol solution for disinfection for ≥ 30 min. Or use a disinfectant solution containing 500 mg/L available chlorine to soak for > 10 min for disinfection.

Note: Before disinfection, the dirt and protein adhering to the tools should be cleaned to avoid protein coagulation and denaturation, increasing the difficulty of cleaning.

04 彻底的干燥
Thorough drying

在合适的温度下使钻头充分干燥，温度可设定为 40℃-90℃，最好用高温烘干；若无干燥设备或不耐热工具可选用（不含油）压力枪、无绒的软布进行干燥处理。

注：因为带有水分会影响灭菌因子的穿透，会消耗能量，会使化学灭菌剂稀释，严重者造成灭菌失败。

Under the appropriate temperature, make the drill bit fully dry. The temperature can be set at 40 ° C to 90 ° C, and it is best to use high-temperature drying; if there is no drying equipment or heat-resistant tools, a (non-oily) pressure gun and lint-free soft cloth can be selected for drying treatment.

Note: Because moisture will affect the penetration of sterilization factors, consume energy, and dilute chemical sterilants, which in severe cases will cause sterilization failure.

钻头的清洁及维护
Cleaning and maintenance of the drill

05 包装 Packing

将充分干燥后的工具零件根据钻头柄上的规格标识，找到工具盒内相对应标识的插孔插回到工具盒中。

注：灭菌前必须认真清点种植器械，特别是专用工具盒中的器械，确保序列钻头与器械盒标示位置相一致，以保证手术的顺利进行。

After the tools and parts are fully dried, according to the specification mark on the drill bit shank, find the jack in the tool box corresponding to the mark and insert it back into the tool box.

Note: Before sterilization, it is necessary to carefully count the implant instruments, especially the instruments in the special kit, to ensure that the sequential drills are consistent with the marked positions in the instrument box to ensure the smooth progress of the operation.

06 灭菌 Sterilization

使用下排气压力蒸汽机灭菌器或者使用预真空压力蒸汽灭菌器（134℃，15 分钟）

注：应首选压力蒸汽灭菌，请勿干热灭菌。不得对已锈蚀、生锈的产品进行灭菌。宜将同一批次产品灭菌，灭菌包之间留有缝隙，利于灭菌介质穿透。

Use a down-draft pressure steam sterilizer or a pre-vacuum pressure steam sterilizer (134° C, 15 minutes).

Note: Pressure steam sterilization should be preferred, and dry heat sterilization should not be used. Do not sterilize products that are already rusted or corroded. It is advisable to sterilize products of the same batch, leaving gaps between sterilization packages to facilitate the penetration of the sterilization medium.

07 储存 Storage

灭菌后的工具盒应避免阳光直射，储于避光、干燥、干净的环境。灭菌物品和非灭菌物品应分开放置，并有明显标识。钻头储存时请勿尖部着地，定期对钻头进行检查，发现磨损、头部失尖、卷边、生锈等问题应停止使用并及时更换。

After sterilization, the kit should be kept away from direct sunlight and stored in a light-shielded, dry and clean environment. Sterilized items and non-sterilized items should be placed separately with obvious markings. When storing the drill bit, do not let the tip touch the ground. Regularly inspect the drill bit, and if problems such as wear, loss of tip at the head, curling, and rusting are found, stop using it and replace it in time.

器械锈蚀的原因

Reasons for the rusting of instruments

不锈钢的耐蚀性和不锈性是有条件的。不锈钢含有铬、镍元素，它们具有防锈性，能够在不锈钢表面形成钝化膜。当不锈钢氧化物膜遭到了不断破坏，空气或液体中氧原子就会不断渗入，或金属中铁原子不断地析离出来，就会形成疏松的氧化铁，金属表面也就受到腐蚀，于是不锈钢就生锈了。

The corrosion resistance and non-rusting property of stainless steel are conditional. Stainless steel contains chromium and nickel elements, which have rust prevention properties and can form a passivation film on the surface of stainless steel. When the oxide film of stainless steel is continuously damaged, oxygen atoms in the air or liquid will continuously penetrate in, or iron atoms in the metal will continuously separate out, forming a loose iron oxide, and the metal surface will also be corroded, so the stainless steel will rust.

氯化物的作用

The function of chlorides

氯化物可引起金属点状锈蚀和应力裂纹。

1、目前临床仍常规使用含氯消毒剂浸泡器械。

2、自来水中含有氯离子。

3、蒸汽灭菌用水及终末漂洗用水因处理不合格使水中氯离子超标。

4、手术中使用生理盐水纱布擦拭器械。

5、血液中含有氯化钠，蒸发后形成结晶，直接与器械接触，加重了对器械的损害。

Chlorides can cause punctate corrosion and stress cracks in metals.

1. Currently, chlorinated disinfectants are still routinely used to soak instruments in clinical practice.
2. Chloride ions are contained in tap water.
3. Due to unqualified treatment, the chloride ions in the water used for steam sterilization and final rinsing exceed the standard.
4. Normal saline gauze is used to wipe the instruments during the operation.
5. Sodium chloride is contained in blood, and after evaporation, crystals are formed, which directly contact with the instruments, further aggravating the damage to the instruments.

酸的作用

The functions of acids

清洗剂、除锈剂、消毒剂对器械有不同程度的酸性腐蚀

1、酸性清洁剂可以有效去除器械上的有机物和无机物，但酸性清洁剂易锈蚀器械，对于精细的不锈钢外科器械有不同程度的腐蚀性。

2、除锈剂为酸性，使用过程中易腐蚀器械，因此若在生锈器械的局部进行涂擦是可达到除锈效果的，不建议采用除锈剂浸泡，以免加重器械破坏。

3、含氯消毒剂，二氧化氯等酸性消毒剂对金属有不同程度的腐蚀性。

Cleaning agents, rust removers, and disinfectants have different degrees of acidic corrosion on instruments.

1. Acidic cleaners can effectively remove organic and inorganic substances on instruments, but acidic cleaners are prone to rusting instruments and have different degrees of corrosiveness to fine stainless steel surgical instruments.
2. Rust removers are acidic and are prone to corroding instruments during use. Therefore, if it is applied by smearing on the local area of rusty instruments, the rust removal effect can be achieved. It is not recommended to soak with rust removers to avoid aggravating the damage to the instruments.
3. Acid disinfectants such as chlorine-containing disinfectants and chlorine dioxide have different degrees of corrosiveness to metals.

器械锈蚀的原因

Reasons for the rusting of instruments

水的作用

The function of water

1、水作为清洗剂，消毒剂及除锈剂的溶剂，用于蒸汽灭菌、预洗、漂洗及终末冲洗。水的性质也是影响器械锈蚀的因子，水的质量越高，最后冲洗的器械生物负载量越低，色斑，水垢形成的概率越小，纯水氯含量过高或冲洗不干净都会腐蚀器械。

2、器械上残留的水膜会吸收空气中的有害化学物，如常见的氯化物，吸收后立刻成为化学电解液，使氧化膜保护层被破坏，失去保护的钢材裸露在空气中，引起器械锈蚀。

1. Water serves as the solvent for cleaning agents, disinfectants, and rust removers, and is used for steam sterilization, pre-washing, rinsing, and final rinsing. The nature of water is also a factor affecting the rusting of instruments. The higher the quality of water, the lower the biological load of the finally rinsed instruments, and the smaller the probability of the formation of stains and scale. If the chlorine content in pure water is too high or the rinsing is not clean, it will corrode the instruments.

2. The residual water film on the instruments will absorb harmful chemicals in the air, such as common chlorides. Immediately after absorption, it becomes a chemical electrolyte, destroying the protective oxide film layer, and the steel without protection is exposed in the air, causing the rusting of the instruments.

环境因素

Environmental factors

1、大气温度与湿度两者关联影响金属锈蚀，大气中的水蒸气含量随气温升高而增大，气温高促使锈蚀加剧，尤其在潮湿环境中，气温越高，锈蚀速度越快。

2、如果大气与金属间有温差。则在温度低的金属表面形成冷凝水，也会导致生锈。大气中对金属具有腐蚀性的元素最为常见，其中氯化物最为主要。

1. Both the atmospheric temperature and humidity have an associated impact on metal rusting. The water vapor content in the atmosphere increases with the increase in temperature, and a high temperature promotes the intensification of rusting. Especially in a humid environment, the higher the temperature, the faster the rusting speed.

2. If there is a temperature difference between the atmosphere and the metal, condensed water will form on the surface of the metal with a lower temperature, which will also lead to rusting. Among the elements in the atmosphere that are corrosive to metals, the most common ones are those with corrosive elements, among which chlorides are the most important.

机械作用

Mechanical effect

带关节手术器械咬合处磨损多，器械的关节处一定是最容易生锈的地方，氧化膜经过磨损，器械会逐渐失去保护变得脆弱，器械就会加快生锈。清洗器械选用不当也会损伤器械表面的保护层。

For surgical instruments with joints, the occlusion area experiences more wear. The joints of the instruments must be the places most prone to rusting. After the oxide film is worn, the instruments will gradually lose protection and become fragile, and the instruments will rust faster. The improper selection of cleaning instruments can also damage the protective layer on the surface of the instruments.

如何处理锈蚀

How to deal with rust

轻微 Slight

轻微的锈蚀，可以使用除锈光亮布擦拭去除。

Minor rust can be removed by wiping with a rust removal and brightening cloth.

较严重 Relatively serious

对于较严重的锈蚀，可使用酸性清洗剂（除锈剂）将锈蚀溶解去除。

For more serious rust, acidic cleaning agents (rust removers) can be used to dissolve and remove the rust.

严重 Serious

严重的锈蚀通过维修机构进行研磨和抛光、可以机械方式去除，但无法恢复成原来的出厂状态。

For severe rust, it can be ground and polished through maintenance institutions and removed in a mechanical way, but it cannot be restored to its original factory state.

无法去除 Unable to remove

如经以上处理仍无法去除锈蚀器械，应剔除不再使用，以免对患者造成安全隐患。

If the rust on the instrument cannot be removed through the above treatments, it should be removed and no longer used to avoid potential safety hazards to patients.

注意 Pay Attention ！

器械表面出现褐红 / 黑色的污渍不一定是生锈了，首先，应区分污渍和锈蚀。

污渍，指松散地附着在器械表面的残留污染物。使用棉布反复涂擦，可将污渍从器械表面清除，污渍对器械表面无损坏。血液组织、消毒剂、清洗剂及其他污物均可残留在器械表面，形成污渍。

锈蚀，指器械表面发生氧化反应所形成的氧化物，器械表面完好性已破坏。

使用橡皮檫摩擦污迹，有助于判断是污渍或锈蚀。若涂擦后，器械表面仍然完好，表明只是顽固污渍；若涂擦后，器械表面出现凹坑或暴露出黑色的生铁，则该器械已被锈蚀。

器械的锈蚀程度是因器械的使用次数、消毒、清洗的方法等因素相关。

The brown/black stains appearing on the surface of the instrument may not necessarily be rust. First of all, it is necessary to distinguish between stains and rust.

Stains refer to residual contaminants loosely attached to the surface of the instrument. By repeatedly rubbing with cotton cloth, the stains can be removed from the surface of the instrument, and the stains do not cause damage to the surface of the instrument. Blood tissue, disinfectants, cleaning agents, and other dirt can all remain on the surface of the instrument, forming stains.

Rust refers to the oxides formed by the oxidation reaction on the surface of the instrument, and the integrity of the surface of the instrument has been damaged.

Rubbing the stain with an eraser helps to determine whether it is a stain or rust. If after rubbing, the surface of the instrument remains intact, it indicates only stubborn stains; if after rubbing, pits appear on the surface of the instrument or black pig iron is exposed, then the instrument has been rusted.

The rusting degree of instrument is related to factors such as times it used, disinfection and cleaning method.