Sinus Lift Drill

Technology of SSI
Revolution of Sinus Lifting
Innovative SLD Technique is the Art & Science

Protocol
1. Specifications and applications of SLDs

2. Stoppers specialized for SLDs

3. SLD cleaning

Four cleaning recesses at the bottom of SLD body and three identification devices on the body allow easy cleaning and perfect sterilization and disinfection.
The composition of SLD kit and a syringe which was specially designed for SLD

**specially designed for SLD**

A syringe which was specially designed for SLD has a 2.8mm diameter which is the same as the size of SLD 2.8 for flawless injection of physiological saline or other fluid graft material during sinus lifting using SLD. The syringe is designed to inject the content therein without residue. Therefore, it is more economical than normal disposable syringes as waste of graft material can be prevented. The maximum capacity of SLD syringe is 1.0cc (application of powdery graft material not allowed).

**The composition of SLD kit**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLD (3 types)</td>
<td>Dia 2.8</td>
</tr>
<tr>
<td></td>
<td>Dia 3.4</td>
</tr>
<tr>
<td></td>
<td>Dia 4.0</td>
</tr>
<tr>
<td>Metal Stopper Specially</td>
<td>11.5mm</td>
</tr>
<tr>
<td>Designed for SLD (7 types)</td>
<td></td>
</tr>
<tr>
<td>H-Drill (1 type)</td>
<td>13.0mm</td>
</tr>
<tr>
<td>Metal Stopper Specially</td>
<td>12.5mm</td>
</tr>
<tr>
<td>Designed for H-Drill (2 types)</td>
<td>11.5mm</td>
</tr>
</tbody>
</table>

All the products including a storage case are individually available for purchase. But syringes which were specially designed for SLD and Elastic Stopper should additionally be purchased. A storage case can be sterilized with an autoclave.
Methods for using H-drill and metal stoppers

In SLD, the safety device that was specifically designed inside prevents the damage of maxillary sinus membrane (Fig. A). In SLD, in cases in which the thickness of cortical bone exceeded 1.65 mm, only 1.65 mm is drilled. It was designed in such a manner no further drilling should occur, and kept spinning with no drilling thereafter. The safety rod is pushed inside at a length of 1.65 mm. At this time, the protrusion is formed in the cortical bone of maxillary sinus floor and it prevents further progression of drilling. This is a basic mechanism (Fig. B). Accordingly, once the protrusion is formed, a 12.5 mm stopper is installed in H-drill. Then, after the additional drilling is performed for approximately 10 seconds, the protrusion should be removed. And then, a drilling should be resumed using SLD, this would safely penetrate the maxillary sinus floor (See below).

In cases in which the thickness of residual alveolar bone is smaller than 3 mm, a 11.5mm stopper should be installed in H-drill and the initial drilling should be performed accordingly. This should be followed by the use of SLD. Besides, if a hole should be created by installing an 11.5 mm stopper in H-drill, the SLD would not be slipped at this site (See left).
The thickness of cortical bone on the maxillary sinus floor

Bone height
In cases in which a sinus lifting is performed via a vertical approach, two cortical bones (biconical bones) are encountered. Firstly, following the penetration of cortical bone of alveolar crest whose rigidity is relatively lower, the cortical bone of sinus floor whose rigidity is relatively higher is encountered across the cancellous bone. The successful treatment outcomes of sinus lift are based on how the cortical bone of sinus floor with a relatively higher rigidity can be penetrated. According to some cases, in which the thickness of residual alveolar bone is smaller than 3mm, the cancellous bone almost disappears. The cortical bone of alveolar crest is merged with the cortical bone of sinus floor. Accordingly, there are some cases of mono-cortical bone rather than bi-cortical bones. In these cases, a relatively higher degree of rigidity can be confirmed clinically.

The meanings of 3, 6 and 9

- **< 3mm**
  (only bone graft recommended)
- **3mm ~ 6mm**
  (mean thickness of soft tissue)
- **> 9mm**
  (only dental implant placement available without grafting materials)

- Even in cases in which the height of residual alveolar bone is lower than 3mm, so long as the initial fixation force could be obtained, it is recommended to perform a sinus grafting simultaneously with the placement of dental implants.
Clinical procedure using the SLD technique

Sinus Lift Drill Technique
The Flapless Sinus Lift Drill Technique Using SLD, Hydraulic Effects and Bone Graft Materials Without Autogenous Bones

**Preliminary phase** The high-speed drilling using H-drill (\( > 50 \text{Torque} / 1,000 \text{RPM} \))
If SLD 2.8 should be initially used, there would be a sliding. Accordingly, an initial drilling should be performed in a high-speed mode by installing an 11.5 mm stopper in H-drill. Particularly in cases in which the height of residual alveolar bone is smaller than 3 mm and if SLD should be used following the drilling by installing an 11.5 mm stopper in H-drill, SLD would not be slided and this would make it easier to penetrate the maxillary sinus floor.

**Phase 1** The initial high-speed drilling using SLD (\( > 50 \text{Torque} / 1,000 \text{RPM} \))
An initial high-speed drilling should be performed by installing an appropriate stopper in SLD 2.8 immediately until it reaches the maxillary sinus floor. This is because the adjacent areas to the maxillary sinus floor should be promptly drilled. Besides, if a low-speed drilling should be done since the initial stage, a drill would be slipped (A low-speed drilling is allowed using SLD following the use of H-drill).

**Phase 2** The drilling of maxillary sinus floor (\( < 50 \text{Torque} / 50 \text{RPM} \))
While rotating SLD in a low-speed mode, it is pushed until it reaches the maxillary sinus floor. A drilling is done while gazing at an identification device. While repeating two maneuvers such as drilling and stopping, the drilling should be done. Once a stopper which was initially installed reaches the tissue, it should be replaced by the next-step stopper and the drilling should be continued accordingly. The difference in the height of a stopper between the steps would be 1.5 mm (seven types ranging from 11.5 mm to 2.5 mm). When there is a feeling that SLD simply keeps spinning without drilling although a stopper compresses no tissues, a drilling should be discontinued and the next step should be performed accordingly (See Page 4).

Hint: In case of very healthy and strong bone, this shape of remain hinder a drill from penetrating the bone. So with H-drill it should be taken off.
Clinical procedure using the SLD technique

(Phase 3) The removal of protrusion using H-drill with a 12.5mm stopper (A synchronous use of a low-speed and a high-speed mode is possible)

With the use of installing a 12.5mm stopper in H-drill, the protrusion formed in the maxillary sinus floor should be removed. In cases in which the height of cortical bone in the maxillary sinus floor is smaller than 1.65 mm or otherwise cases in which the cortical bone is relatively smoother, the procedure can be performed solely using SLD without H-drill. The mean frequency of using H-drill per one hole during the procedure would be approximately one time (See Page 16).

(Phase 4) The penetration of the maxillary sinus floor
(< 50Torque / 50 RPM)

The status immediately after the penetration of maxillary sinus floor is that 1.2mm of it, corresponding to the diameter of safety rod, is penetrated. The cutting edge of SLD is still present within the alveolar bone. That is, it is protruded above the maxillary sinus floor where only safety rod of SLD is penetrated. Then, it smoothly contacted the maxillary sinus membrane. Because the cutting edge of SLD is present within the alveolar bone, it is safe. At this time, in cases in which the maxillary sinus membrane is strongly adhered to the alveolar bone in the maxillary sinus floor, the red band of identification device is not completely seen and it is slightly observed. Accordingly, if the red band of identification device should be shown to be lifted, if any, a drilling should be discontinued. This should be followed by the preparation for the next step, the infusion of a saline.
Clinical procedure using the SLD technique

(Phase 5) The elevation of maxillary sinus membrane using SLD syringe (the infusion of a saline)

In a hole which is formed by drilling, a saline-containing syringe which is specifically designed for SLD is inserted in a hole. Then, while the pressure is softly exerted, a saline is infused at a sufficient volume of 1-2cc. That is, the maxillary sinus membrane should be primarily sufficiently extended using a saline. A saline can be infused if there are any small perforations in the maxillary sinus floor. Unless a saline should be infused, the maxillary sinus floor would never be perforated. Accordingly, while gazing at the identification system, after the drilling is further performed, a lifting should be resumed using a saline.

Phase 6) The trimming on the end of hole toward sinus floor (< 50Torque / 50 RPM)

Because the maxillary sinus membrane was sufficiently elevated using a sinus lifting with a saline, the additional drilling could be further performed. An additional drilling should be performed in such a manner that a hole should be extended using a drilling force based on the rotational force rather than penetrating the floor. Even the drilling which was performed safely during a 1- to 2-second period in a low-speed mode would be sufficient.

(Phase 7) The infusion of grafting materials

A sufficient amount of grafting materials should be done by repeatedly exerting the pressure with grafting materials placed in a syringe which was specifically designed for SLD. Due to the methods based on the hydraulic effects, in cases in which a lifting is done in a dome shape, the maxillary sinus membrane would be elevated 1mm per a mean volume of grafting materials of 0.1cc (these effects can be stated to cover the volume of dental implants that should be substantially placed). It should be noted, however, that a greater deal of grafting materials would be consumed as compared with cases in which a lifting would be done in a wider area of dome in elevating the maxillary sinus membrane. It is therefore recommended that a sufficient amount of grafting materials should be injected.

Hint: Saline should be between 0.5cc~1cc.
If Saline injected too much, it takes a bit long time to be heal up.
**Clinical procedure using the SLD technique**

(Phase 8) **The final drilling and rinsing the hole (> 50 Torque / 1,000 RPM)**

According to the diameter of dental implants which should be placed, the final drilling should be performed using SLD with an appropriate degree of diameter.

Commonly, this phase is neglected during the procedure. But it is a phase where a hole is extended and the residual grafting materials are rinsed in an inlet of hole which is formed. In cases in which there are residual grafting materials in a hole, they could be placed between the dental implant to be placed and the wall of hole and this would play a role as a foreign body reaction. Accordingly, rinsing is an essential process.

**Important – Keep the Torque and RPM as it should be.**

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(Phase 9) **The placement of implant (20~40 Torque / > 50 RPM)**

Bone compaction → Using the diameter and slope of implant
SLD technique → Bi-Cortical Bone Fixation

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**Key know-how of SLD technique**

Key know-how of SLD technique is how the hole of maxillary sinus floor which is slightly perforated by SLD is widen just as wide as the diameter (size) of SLD blade safely without damage to maxillary sinus membrane. Maxillary sinus membrane is elevated sufficiently by physiological saline through the hole of maxillary sinus floor which was slightly perforated and graft material is inserted a little. If the graft material is inserted smoothly, it is continued to be inserted sufficiently; if not, secondary drilling at low speed should be performed for 1 or 2 seconds to widen the hole of maxillary sinus floor before inserting additional graft material. Especially for initial use of SLD, repeated processes of inserting graft material and drilling at low speed will succeed in maxillary sinus membrane elevated more safely.

In summary, there are two procedures for the SLD technique: First, physiological saline injected, hole widened, and graft material inserted; second, physiological saline injected, small amount of graft material attempted to insert, hole widened, and graft material inserted.

The first procedure can save graft material and the second procedure can reduce the possibility of blade reached to the maxillary sinus membrane by inserting small amount of graft material. Both procedures assure safety.
The sequence of the sinus grafting using SLD

(Preliminary phase) The high-speed drilling using H-drill (> 50 Torque / 1,000 RPM)

(Phase 1) The initial high-speed drilling using SLD (> 50 Torque / 1,000 RPM)

(Phase 2) The drilling of maxillary sinus floor (< 50 Torque / 50 RPM)

(Phase 3) The removal of protrusion using H-drill with a 12.5mm stopper (A synchronous use of a low-speed and a high-speed mode is possible)

(Phase 4) The penetration of maxillary sinus floor (< 50 Torque / 50 RPM)
The sequence of the sinus grafting using SLD

(Phase 5) The elevation of maxillary sinus membrane using SLD syringe (the infusion of a saline)

(Phase 6) The trimming on the end of hole toward sinus floor (< 50 Torque / 50 RPM)

(Phase 7) The infusion of grafting materials

(Phase 8) The rinsing the hole and the final drilling (< 50 Torque / 1,000 RPM)

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(Phase 9) The placement of implant (20~40 Torque / > 50 RPM)

Bone compaction → Using the diameter and slope of implant
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Post-prostodontic 20100403
Post-prostodontic 20100825
Tip - Method for resolving perforated maxillary sinus membrane

Socket Lifting Technique (The time point of revision surgery - appropriate after 5 weeks)

1. During flap surgery, a flap is separated from the soft tissue in a hole (a flap is engaged with the soft tissues in the hole).

2. Soft tissues in the hole are attached to the maxillary sinus membrane. Using a gauze, the soft tissue and the maxillary sinus membrane are elevated simultaneously.

3. Graft materials are inserted.

Part 3
- Hands on

Part 4
- Questions and answers

When a safety rod operates at 45° slop of maxillary sinus floor, the area from the beginning of the side blade to 1 mm distance downwards contacts with the maxillary sinus membrane. When the slop is more than 60°, the area from the beginning of the side blade to 2 mm distance downwards contacts with the maxillary sinus membrane. Therefore, it is recommended to frequently monitor whether the maxillary sinus floor is perforated by injecting physiological saline, if sufficient drilling is assumed to the height planned, rather than relying on the identification device when the slop is more than 60°. Easy and safe maxillary sinus lift and drilling procedure.

- 1 case, tray for gel formation of concentrated platelet
- 1 case, dental measurement tools
- Current patent application for other 5 cases related to implant surgeries
New SLD launched! No failure, removing force and serviceable frequency increased TWICE.

Why is SLD EASY and FAST?

1. SLD has an excellent forward drilling force, which allows shorter procedure duration.
2. Operational method is the same as general implant drills and it is easy to use.
3. Heating generation is limited during operation at high speed, which reduces pain after procedure.
4. Amount of graft material requires only one third of amount required for lateral approach.
5. Bi-cortical fixation can be acquired more feasibly than Osteotomes.

<table>
<thead>
<tr>
<th>(mm)</th>
<th>2.8 / 3.4 / 4.0(3type)</th>
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Why is SLD SAFE?

1. A specially designed safety device is installed within SLD to prevent maxillary sinus membrane from being damaged. SLD is designed to assure safety: if the thickness of cortical bone of the maxillary sinus floor is more than 1.65 mm, it drills only as much as 1.65 mm and ceases to continue drilling (you can perforate the maxillary sinus floor safely without damage to the maxillary sinus membrane using H-drill, which is the auxiliary drill of SLD, with dedicated Stopper installed).
2. You can identify whether the maxillary sinus floor is perforated via an identification device. When a red strip is identified during drilling at low speed, you should stop drilling (the identification device may move slightly depending on elasticity of the maxillary sinus membrane).
3. In consideration of expected height of residual alveolar bone, using Metal Stopper which was specially designed for SLD can prevent incidental accidents.