

PRACTICE GUIDELINE

Guideline for Denture Relining

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1. Introduction

With the increasing attention to oral health in recent years, the number of residual teeth retained by individuals has been increasing with each generation. According to the survey of dental diseases in 2005, the percentage of individuals between 80 and 84 years of age retaining 20 or more teeth was 21.1%, thus exceeding 20% for the first time since this survey was started. The survey in 2005, however, showed that there was still a high percentage of individuals with multiple missing teeth, i.e., individuals using dentures.

It is well known that the alveolar ridge inevitably undergoes resorption with advancing age, irrespective of whether or not the individual uses dentures. For this reason, dentures are destined to show deterioration in fit no matter how well they are initially prepared. Means available to deal with loss of denture fit are fabricating new dentures or relining. Relining can reduce the frequency of a patient's visits and medical expenses as compared to fabricating new dentures.

Under such circumstances, the Japan Prosthodontic Society decided to prepare relining guidelines. When preparing this set of guidelines, we followed the procedures for preparing evidence-based clinical practice guidelines. However, be-

cause of the specific nature of dental treatment and dentistry, it is difficult to conduct studies designed to provide the evidence for each treatment in this field. Because of these limitations, we prepared this set of guidelines on the basis of limited evidence obtained by searching for scientific papers and consensus among specialists.

This guideline will have to be periodically modified when additional rationales or clinical findings are revealed in scientific clinical studies.

2. Procedure for preparing the guideline

1) Identification of questions

The Guideline Preparing Committee was set up and tried to identify the questions for relining.

2) Literature search

From papers written in Japanese listed in the *Japana Centra Revuo Medicina* for the period 1983-2005 and papers written in English listed in the MEDLINE for the period 1982-2005, members of the Guideline Preparing Committee and the Abstract Preparing Committee of the Japan Prosthodontic Society selected those pertaining to relining, using the following search algorithm. After reviewing these selected papers, the Committee selected those to be adopted into the guidelines.

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Japana Centra Revuo Medicina: January 1983 through December 2005

Search formula

- (1) A: 575 papers
(reline or relining or lining) or (rebase or rebasing)
((reline/AL or (rebasings method/TH or relining/AL) or (rebasings method/TH or lining/AL) or (rebasings method/TH or rebase/AL) or rebasing/AL)) AND (PT=original paper SB=dentistry)
- (2) A and Meta-Analysis: 0 papers
- (3) A and Randomised Controlled Trial: 2 papers
- (4) A and Cohort Studies: 0 papers
- (5) A and (examination or diagnostic testing): 12 papers
- (6) A and (indication or contraindication): 6 papers
- (7) A and (direct method or indirect method): 24 papers
- (8) A and (light-polymerizing or autopolymerizing or thermal polymerization): 114 papers
- (9) A and soft lining material: 117 papers
- (10) A and hard lining material: 3 papers
- (11) A and physical properties: 56 papers
- (12) A and temperature: 21 papers

MEDLINE: January 1982 through December 2005

Search formula

- (1) A: 524 papers
Denture Liners[MeSH Terms] OR Denture Rebasings[MeSH Terms]
Denture Liners[MeSH Terms]:
Denture Liner, Liner(Denture), Liners (Denture), Cushion Liners, Cushion Liner, Liner(Cushion), Liners(Cushion)
Denture Rebasings [MeSH Terms]:
Denture Rebasings, Rebasings(Denture), Rebasings(Denture), Denture Relining, Denture Relinings, Relining(Denture), Relinings(Denture)
- (2) A AND Meta-Analysis: 2 papers
- (3) A AND Randomized Controlled Trial: 10 papers
- (4) A AND Controlled Trial: 16 papers
- (5) A AND Cohort Studies: 36 papers
- (6) A AND Case Control Studies: 8 papers
- (7) A AND (examination OR diagnostic testing): 25 papers
- (8) A AND (indication OR contraindication OR applicability OR adaptability): 4 papers

- (9) A AND (direct technique OR direct method OR direct relining OR indirect technique OR indirect method OR indirect relining): 15 papers
- (10) A AND (light-polymerizing OR light-polymerized OR light-curing OR light-cured OR autopolymerizing OR autopolymerized OR chemically-curing OR chemically-cured OR heat-polymerizing OR heat-polymerized OR heat-curing OR heat-cured): 93 papers
- (11) A AND (soft denture liners OR soft relining materials OR resilient denture liners OR resilient relining materials): 250 papers
- (12) A AND (hard denture liners OR hard relining materials): 83 papers
- (13) A AND (physical properties OR mechanical properties): 78 papers
- (14) A AND (curing temperature OR polymerizing temperature): 16 papers

3) Determining the grade of recommendation

The grade of recommendation for each component of the guideline is shown below.

Grade	Description	Remark
a	Strongly recommended (based on firm evidence)	Evidence level I or II is available
b	Moderately recommended (based on moderate evidence)	Evidence level III or IV is available
c	Recommendable (based on weak evidence)	Evidence level V or VI is available Cross-sectional study is available Data from basic experiments available
d	Not recommended	Disproof available

Evidence level

- I: Systematic reviews and meta-analyses of randomized controlled trials
- II: Randomized controlled trials
- III: Non-randomized intervention studies
- IV: Observational studies
- V: Non-experimental studies
- VI: Expert opinion

4) Preparation and evaluation of the guideline

On the basis of papers selected by members of the Relining Guideline Preparing Committee, this set of guidelines was prepared, and then modified after evaluation by members of the Relining Guideline Evaluation Committee.

3. Definition

The term “relining” means renewing one layer of the basal surface of the denture with new base material in cases in which the mandibular position and the occlusal relationship are correctly retained, but the basal surface fitness has deteriorated.

4. Classification

Relining can be divided into direct relining (relining with border molding in the mouth) and indirect relining (relining with the taking of a dynamic impression and subsequent processing on the denture in the laboratory).

Q. Criteria used for selecting direct versus indirect methods

Recommendation

The direct method is advisable for cases in which the denture cannot be deposited, cases in which stimulation of the mucosa overlying the residual ridge is unlikely to occur, and cases in which a certain thickness can be ensured and the occlusal vertical dimension is unlikely to be changed. The indirect method is advisable for cases in which the denture can be deposited. (grade c)

The direct method is often used since it does not necessitate deposition of the denture and can be implemented at the dental office, although it involves the risk of stimulation due to monomers and heat generated from polymerization.¹⁻³ When relining is performed using the direct method, particularly when soft materials, which need adequate thickness are used,⁴ the basal surface of the denture needs to be trimmed to an extent corresponding to the thickness of the relining material. It is sometimes difficult to ensure the required thickness or to avoid a change in occlusal vertical dimension due to the necessity of ensuring adequate thickness. The indirect method has advantages over the direct method in that an appropriate thickness can be ensured more easily, and the adhesion is stronger due to the lack of exposure to saliva.⁵ Furthermore, the use of a relining jig allows the procedure to be completed within several hours with the indirect method, leading to a shorter period during which the denture needs to be deposited.

5. Types and features of materials

1) Hard and soft materials

Materials used for relining can be divided into two types (hard and soft). Hard materials are made of acryl, while soft materials are made of acryl, silicone, polyolefin, etc. Because the composition and physical and mechanical properties differ even among materials of the same type,^{6,7} it is essential to know the features and characteristics of individual materials well and to select the optimal material for a given case.

Q. What criteria are used to select between hard and soft materials?

Recommendation

Hard materials are usually selected. Soft materials are selected for cases in which stress-breaking is needed. (grade b)

Among soft materials, acryl-based materials are characterized by high viscoelasticity, while materials made of silicone or polyolefin are characterized by high elasticity. Materials made of silicone undergo less change in physical properties over time and exhibit high durability. Materials made of acryl, on the other hand, undergo changes in muco-elasticity over time, gradually lowering stress-breaking effects.⁸⁻¹¹

2) Materials of different polymerization types

The types of polymerization of the materials used for relining and rebasing include the autopolymerizing type, light-polymerizing type, heat-polymerizing type, and so on. Materials of the autopolymerizing type and light-polymerizing type are used for the direct method, while materials of the heat-polymerizing type, autopolymerizing and light-polymerizing types are employed for the indirect method.

If a light-polymerizing material is used, polymerization and hardening take place after the liquid (monomer) is mixed with the powder (polymer). Once this type of material enters the residual ridge or a tooth undercuts and hardens there, it is sometimes difficult to extract. Therefore, care is needed to ensure that the material is taken out before it hardens if it is used for partial dentures.

Materials of the light-polymerizing type become polymerized and harden when irradiated. For this type of material, several cycles of application and removal are possible, allowing the ex-

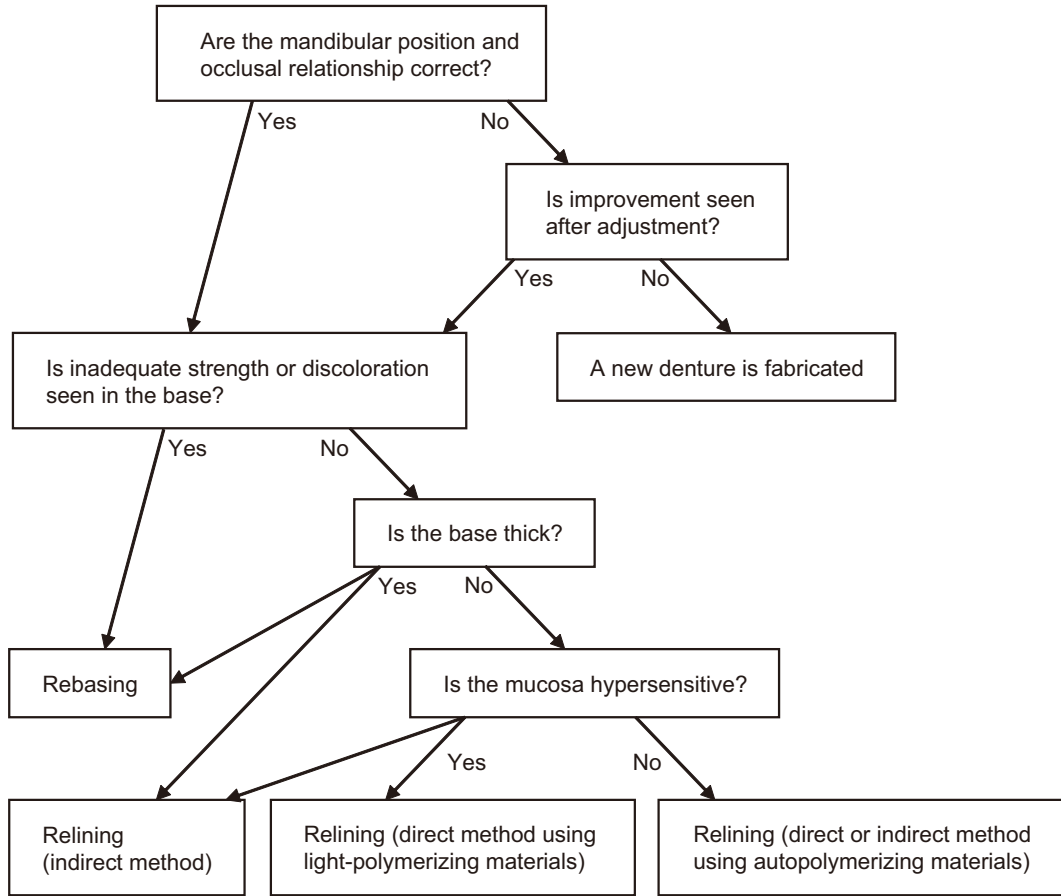


Fig. 1 Examinations and indications

cessive part to be eliminated. Furthermore, since this type of material is less likely to stimulate the mucosa,¹² it can be used even for patients with hypersensitive mucosa.

When materials of the heat-polymerizing type are used, the denture is placed in a flask, which is then filled with the denture base material to induce heat-polymerization. This type of material is more durable than the other types,¹³ but has drawbacks such as being complicated and time-consuming. Because of these features and the errors usually involved in polymerization, materials of the autopolymerizing type or the light-polymerizing type are often used clinically.

6. Examinations and tests

If poor fitness of the denture is suspected, whether or not a given patient should be indicated for relining is assessed.

Q. What examination is needed prior to relining?

Recommendation

The optimal method for a given case is selected by performing the examinations for relining, shown in Figure 1. (grade c)

1) Checking the fit between denture and mucosa

The fit of the basal surface of the denture to the mucosa overlying residual ridge is checked using fitness test materials. In addition, retention and stability of the denture within the oral cavity are tested.

In cases in which the denture is fit to the mucosa but tends to become detached from the mucosa during occlusion or cases in which pain is noted in the mucosa, the mandibular position and occlusal relationship are checked, and whether or not the abnormality is improved by occlusal adjustment or tissue treatment is examined.

2) Checking the occlusal relationship including mandibular position

Whether the occlusal relationship involving mandibular position, occlusal vertical dimension is appropriate or not, is checked. If a minor problem is found in the mandibular position or occlusion, whether or not the problem is improved following occlusal adjustment or reformation of the occlusal surface is tested. Relining is indicated only in cases in which the problem is improved following such adjustments.

3) Checking alveolar ridge mucosa

The mucosa overlying the residual ridge is checked. If any abnormality is found in the mucosa, tissue conditioning is performed prior to relining.

7. Indications

Q. What are the indications for relining?

Recommendations

Relining is indicated in cases in which the mandibular position and occlusal relationship are appropriate but the fit of the denture base to the mucosa is poor. (grade c)

Contraindications

Relining is contraindicated in cases in which the mandibular position or the occlusal relationship cannot be corrected. The direct method is contraindicated in cases in which the mucosa is hypersensitive.

Q. What criteria are used for selection of a relining method?

Recommendations

The direct method is advisable for correction of a minor lack of perfect fit. To deal with moderate or more severe lack of fitness of dentures, the indirect method is advisable. The method using a jig is capable of keeping the occlusal vertical dimension when taking an impression and can shorten the time required for manipulation. (grade c)

8. General procedures for relining

(Fig. 2)

Prior to relining, one layer of the basal surface of the denture needs to be trimmed. In cases with flabby gums or bone tonus, the amount of

mucosa to be trimmed is increased or a spillway is created as needed. Care must be exercised to avoid excessive trimming of the mucosa since the strength of the denture usually decreases as the resin base becomes thinner.¹⁴

1) The direct method

After one layer of the basal surface of the denture is trimmed and a fresh resin surface is exposed, the surface is coated with adhesive and the following procedures are performed:

(1) Procedure using a autopolymerizing resin

- (a) Relining material is mixed; once their fluidity decreases and it has a cream-like consistency, the entire basal surface of the denture is built up evenly. Once the relining material changes from a liquid-look to a satiny finish, the mixture is inserted into the patient's mouth.
- (b) The patient bites down lightly in the intercuspal position and then border molding is done.
- (c) Once the resin is somewhat stiffer than a putty-like consistency, the denture is taken out of the patient's mouth and excess resin is removed. The denture is again seated in the patient's mouth, and the dentist waits for the resin to harden. An accelerator may be used to completely harden the denture outside of the patient's mouth.
- (d) After final hardening, the denture is taken out of the patient's mouth.
- (e) Adjustments are made to sites needing morphological correction and relief, occlusal adjustments are made, and polishing is done.

(2) Procedure using light-polymerizing resin

- (a) Light-polymerizing resin is built up on the basal surface of the denture and inserted into the patient's mouth.
- (b) The patient bites down lightly in the intercuspal position and then border molding is done.
- (c) After excess resin is removed, the same procedure is done again in the patient's mouth. This procedure is repeated while immersing the denture in warm water and reducing its viscosity.
- (d) Cold water is added to the patient's mouth and the viscosity of the resin is increased; the dentist removes the denture carefully to keep from deforming its shape.

- (e) The entire surface of the light-polymerizing resin is coated with air-blocking agent and polymerized with a light-curing unit.
- (f) The air-blocking agent is rinsed off with running water.
- (g) Adjustments are made to sites needing morphological correction and relief, occlusal adjustments are made, and polishing is done.

For removable partial dentures, the rest is adjusted to match the rest seat. The denture is held in place by finger pressure so that it is seated in a specific position in the patient's mouth and border molding is done. When autopolymerizing resin is used, resin enters the undercut area of the tooth or residual ridge and hardens; the denture may dislodge, so the denture must be removed from the patient's mouth several times until the resin hardens.

2) The indirect method

After one layer of basal surface of the denture is trimmed, an impression is taken with a highly fluid precision impression material using the denture base as a tray or an impression is taken with a tissue conditioner or dynamic impression material. After the patient's occlusion is checked with a check bite, the following procedures are performed:

(1) Use of relining-jig

- (a) After boxing, plaster is poured onto the impression surface and a cast is made.
- (b) Plaster is built up on the bottom of the relining-jig, the denture is placed on top, and a core for the occlusal surface is made.
- (c) The top of the jig is assembled, plaster is built up at the bottom of the cast, and the base is attached to the top of the jig.
- (d) The jig is separated and impression material on the tissue surface of the denture base is removed.
- (e) Tin foil or sheet wax is affixed to flabby gums or bone tonus and a relief is made.
- (f) The cast at the top of the jig is coated with a resin separator.
- (g) One layer of the basal surface of the denture is trimmed, a fresh resin surface is exposed, and this is coated with a resin primer, after which autopolymerizing resin is built up.
- (h) The top of the jig is joined to the bottom and fixed, and excess resin is removed.
- (i) Resin polymerizing is done (e.g. pressure

curing: 1 hr at 2 atm, 20 min. at 4 atm, and so forth).

- (j) Adjustments are made to sites needing morphological correction and relief, and polishing is done.

(2) Use of flask

- (a) After boxing, plaster is poured onto the impression surface and a cast is made.
- (b) Excess impression material at the margins is removed and corrections are made with wax.
- (c) After the ground surface of the denture base is coated with a plaster separator, the denture is placed in a flask.
- (d) The two halves of the flask are separated and impression material on the basal surface of the denture is removed.
- (e) Tin foil or sheet wax is affixed to flabby gums or bone tonus, and a relief is made.
- (f) The cast is coated with a resin separator.
- (g) One layer of the basal surface of the denture is removed, a fresh surface is exposed, and this is coated with a resin primer, after which autopolymerizing resin is built up.
- (h) The upper and lower halves of the flask are combined, excess resin is removed, and the dentist waits for the resin to harden (once curing is complete, dentures are remounted on an articulator and occlusal adjustments are made).
- (i) Adjustments are made to sites needing morphological correction and relief, and polishing is done.

The terms used in this guideline are derived from the Glossary of Prosthodontic Terms, Second Edition (edited by the Japan Prosthodontic Society).

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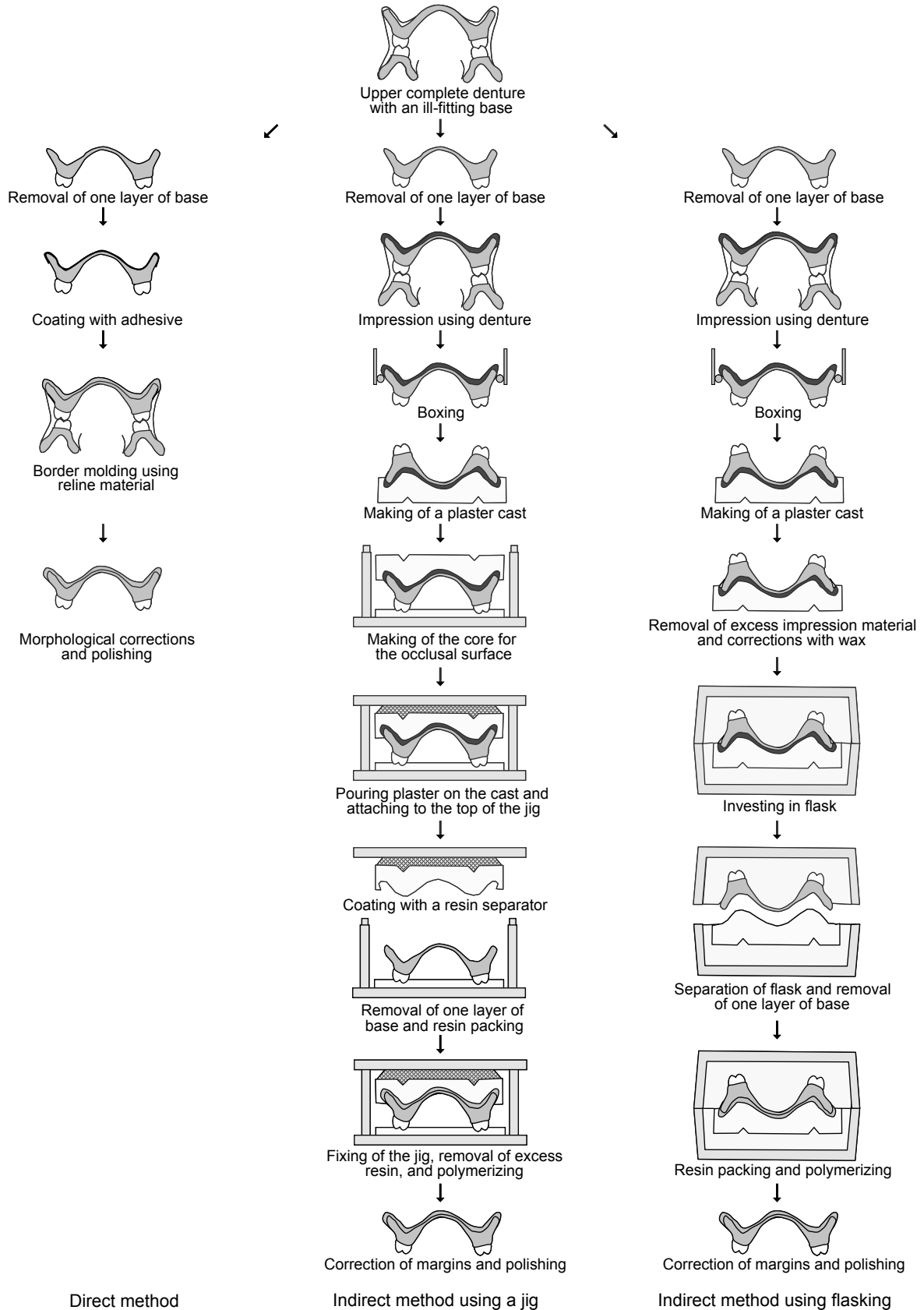


Fig. 2 General procedures for relining