

Chapter 5 - Accidents and complications

Professor of the Nippon Dental University Hospital

Masayori Shirakawa

Associate professor of department of general care, The Nippon Dental University Hospital

Yoshiki Ishigaki

The accidents and complications from the treatment can largely be prevented by selective application of the treatment, accurate preoperative diagnosis and being true to the basics of surgical techniques. It should not be forgotten, however, that even with the slightest surgical interventions, there is still a potential for the unexpected problems to arise from the significant psychological reactions derived from patient's systemic conditions or fear (Table 3-5-1). The methods to reduce the level of stress are also required to be considered (Table-3-5-2). Therefore the potentials for the accidents and complications to occur must be acknowledged, and fully comprehend the need to adjust the environment suitable to overcome these issues.

I. Preoperative accidental symptoms and the solution

A. Systemic accidental symptoms

The systemic accidental symptoms for implant treatment are often observed in individuals with underlying disorders such as cardiovascular diseases (Fig. 3-5-1). The underlying diseases can be divided into the following types:

- ① Patients who have systemic accidental symptom but without any symptoms.
- ② Patients who have awareness of symptoms but have not seen a doctor.
- ③ Patients who visit the medical doctor from time to time.
- ④ Patients who make frequent visits with the medical doctor.

Type	Content	Cause or target
Mental	Anxiety	Pain
		Anestgesia
		Treatment (Contents, tools, convalescence and expence)
	Strain	Sound of turbin
		Dentist
	Worry	Assistant
Atmosphere of teatment room		
Physical	Pain	Needle insertion
		Insertion of drugs
		Treatment (Anesthetic efficacy)

Table 3-5-1
Cause of stress

1) Management for psychological stress
① Fine relationship between patient and doctor
② Indication of psychosedation
2) Management for physiological stress
① Painless local anesthesia
② Certain local anesthesia

Table 3-5-2 Reducing stress levels

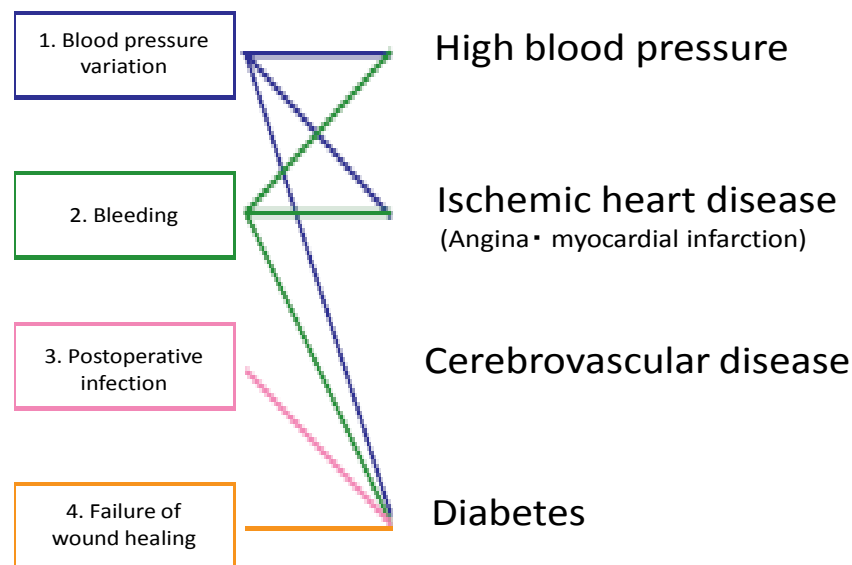


Fig. 3-5-1 Common associations between accidental disease and underlying diseases

There have been significant reductions in the number of individuals who fit into the first two categories as the regular health examinations have been implemented, but there are always exceptions to the rule, therefore should be careful not to neglect these cases. The preoperative consultations should be conducted with the medical doctor for the individuals who have an underlying disease, and are regularly seeing a doctor. The most effective treatment method is to establish a close relationship with the physician in charge, and with the dental anesthetist in some situations to conduct the implant surgery by controlling the systemic conditions as a whole.

There are situations where there is no medical history but due to excessive anxiety of undergoing a surgical procedure, complain of worsening physical wellbeing. In such cases, modifying the conditions such as changing the body positions should be done to enable the patient to relax as much as possible. For example, calm the patient down first, then ensure that the state has been recovered to the normal before administering nitric oxide infusion, intravenous sedation, or general anesthesia in some cases.

II. Perioperative accidental symptoms and the solution

A. Localized accidental symptoms

1. Complications and accidents related to anesthesia

The anesthesia is an indispensable part of the surgical interventions. Within the accidental symptoms or complications that arise during the surgery these can result from anesthesia as well as the surgical techniques. For those arising from general anesthesia, refer to a text book. Here, I will focus on the matters relating to the local anesthetics.

a. Neurogenic shock

Neurogenic shock is caused by a temporary tension of the sympathetic nerve (Vagotonia) resulting from anxiety, tension or terror. The symptoms include cold sweat, pallor, dizziness, nausea, dyspnea, flaccid quadriplegia, decreased blood pressure, bradycardia and weakening of pulse. Onset of generalized seizure may occur with the loss of consciousness in severe cases.

Upon presentation of these symptoms, the patient should be repositioned in a shock posture, with the loosening of any tight area in their clothing such as the belt, then conduct oxygen inhalation. If the patient becomes unconscious, regain respiratory passage; in the case of respiratory arrest, conduct artificial ventilation procedures. Atropine sulfate should be administered to a case of bradycardia, or in the case of blood pressure decrease, administer vasoconstrictor.

b. Hyperventilation syndrome

Hyperventilation is induced by anxiety, tension and terror.

The symptoms include hyperventilation (Dyspnea), anxiety, excitement, palpitation, thoracic compression, stiff fingers (Tetany), and numbness around lips or terminal limb and declined level of consciousness.

This can be overcome with methods such as re-inhalation of expired air using paper bag and administering diazepam where necessary. Midazolam has been known to induce respiratory arrest, therefore should be avoided.

c. Local anesthetic toxicity

Toxicity is known to result from sudden increase in the blood concentrations of the blood due to the administration of local anesthetic agents at high concentrations or a direct administration into the blood circulation.

Initial symptoms include logorrhea, excitement, anxiety, nausea, vomiting, increase in the pulse/respiratory rates and elevation of blood pressure. With the rise in blood pressure, inhibitory symptoms such as loss of consciousness, coma, bradycardia and cardiac arrest can manifest.

Regain respiratory passage and conduct oxygen inhalation (or artificial resuscitation if necessary), checking for the vital signs and establish venal path. In the cases of low irritation of the central nervous systems, monitoring the patient should be sufficient. Treat the convulsions with administration of diazepam, and resuscitate where there is respiratory arrest, decrease in BP, cardiac arrest, or shock symptoms.

d. Local anesthetic allergy

The symptoms often manifest after a few minutes to 15 minutes. Main symptoms include itching, rash, blister and digestive disorders. In severe cases, symptoms of chest pain, laryngeal edema, airway obstruction, tachycardia, decline in BP, and irregular pulses appear. It can progress onto loss of consciousness and cardiac arrest.

These condition should be treated with, first, administration of oxygen in the dorsal position; then administer steroids and anti-histamines having established venal path; or where there is bronchospasm, give bronchodilator. If airway obstruction manifests, conduct intubation, tracheotomy and artificial ventilation; perform resuscitation upon presentation of loss of consciousness, respiratory pause and cardiac arrest.

As a preventative measure, conduct a comprehensive medical consultation, and assess the level of allergy where a history is present. The allergic reaction can sometimes be a result of a response to the antiseptic (methylparaben) included in the local anesthetic, therefore selecting one that does not contain this may be effective.

As a measure of precaution, it might be an idea to get in contact with the emergency medical

organizations.

2. Accidents and complications related to surgery

a. Bleeding

The sources of bleeding can be of the bone origin or the damages to the vessels.

The bleedings from the drilling often can be stopped upon the insertion of the fixture, but where there is damage to the artery in the bone, a significant amount of bleeding can be observed. Provided that the drilling has been contained within the bone, the damage can easily be overcome. It is when the drilling has pierced through the jaw bone, causing damage to the soft tissues, that a haemostatic control is absolutely necessary, having established the source of the bleeding.

In performing surgery to the lingual side of the mandible, there is a risk of causing damages to the submental artery, arteria sublingual and their branches.

As for the maxilla, noting the presence of the greater palatine artery and posterior superior alveolar artery in the molar region to the eminencia maxillae are important.

For the bleeding resulting from vascular injury, the source must be identified to perform haemostatic ligature of the damaged vessel. This type of bleeding is often seen in the non-flap operation conducted with the aim to limit the degree of invasion. The intervention with the low level of invasion can be ineffective, and can risk becoming a blind sighted one that is unfounded, resulting in unexpected circumstances.

The surgery should be conducted having fully comprehended the anatomical properties of the jaw bone, and by exposing the jaw bone by the application of incision and elevation of the gingivae for clarity in the area of surgery, in any case.

b. Nerve damage

Perforations and damages of the mandibular canal have often been noted to have resulted in surgeries that have been conducted on the mandible with insufficient examination, or rough drilling operations (Fig. 3-5-2).

With regards to the self-tap type fixtures, it carries a risk of easily being inserted further than intended, if performed carelessly. Meanwhile, the ceiling type fixture can cause nerve damage at the malleting step, which is the final installation procedure.

The drilling should be done with using a sharp apparatus with utmost care having examined the state of the jaw from the radiographs and CT scans taken before initiating surgery. In drilling to the mandibular molar region, there have been situations where the drills have slipped, damaging the lingual nerve, therefore drilling should be performed by excluding the tongue, and gaining support from the mesial teeth.

In the edentulous jaws with a significant resorption of the alveolar bone, the mental foramen can often be found lying in proximity of the alveolar crest. The incision and detachment conducted in the region close to the mental foramen can cause nerve damage. As a preventative measure, the position of the mental foramen should be determined with orthopantomogram or the CT scan.

c. Subsidence into the nasal cavity or maxillary sinus and their perforations

Where the distance from the alveolar crest to the base of the nasal cavity or the maxillary sinus is limited,

the preoperative imaging analysis is essential to avoid the perforation of the nasal cavity or the maxillary sinus or the subsidence of the fixture into these structures (Fig. 3-5-3,4). In the presentation of continuous abnormalities related to the nasal system, refer to the department of otorhinolaryngology or oral surgery for examination.

For aberration of the implant body into the maxillary sinus, open the sinus from the canine fossa for its removal (Fig. 3-5-5,6). With the induction of maxillary sinusitis, refer to the otorhinolaryngology or the oral surgery unit.

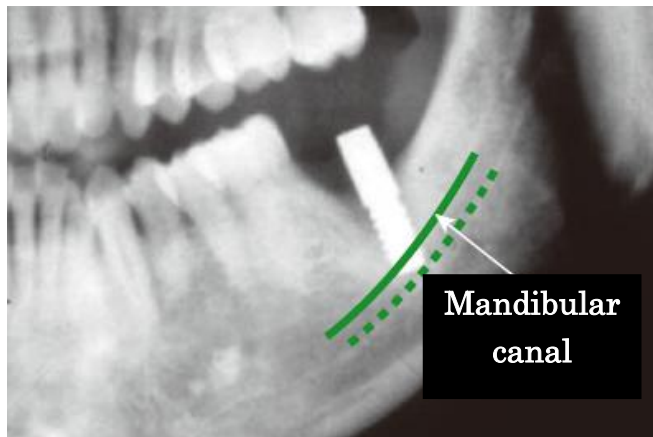


Fig. 3-5-2 Excess insertion of fixture



Fig. 3-5-3 Perforation of the maxillary sinus with the fixture



Fig. 3-5-4 Maxillary sinus aberration with the fixture

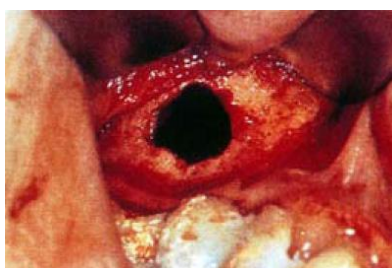


Fig. 3-5-5 Opening the maxillary sinus



Fig. 3-5-6 Implant extraction

d. Failure of primary stability

There have been cases where the primary stability have not been able to be achieved due to softness of the bone structure, or where the drilling has not been suitable or the drill used had been blunt. If the problem is only slight, the self-curing resin can be applied for additional support, and this often results in sufficient stability with extended observation period. The delay in the process of gaining stability can be overcome particularly with HA coated implant if it can exhibit its osteoinducing abilities. Where primary stability cannot be obtained, a replacement of the fixture with a larger diameter than was originally intended may be effective. If this is not successful, the fixture should be removed temporarily, leave a

period to allow healing (bone remodeling) to conduct installation.

B. Systemic accidental symptoms

1. Blood pressure fluctuations (rise in blood pressure)

Hemodynamics is the main issue with respect to the systemic accidental conditions, and manifest in most of the patients with underlined diseases, but most in those with cardiovascular disease.

Regardless of the presence of cardiovascular disease, the increase in blood pressure (BP) is known to occur with the anxiety and nervousness of undergoing surgical procedures. In addition, with the pain from the injection needles can induce secretion of endogenous catecholamine increasing the pressure even further (Fig. 3-5-7). Therefore the monitoring apparatus should be prepared before the surgery. If the BP rises above 200/120 mmHg during the procedure, it should be stopped temporarily to relieve the anxiety and tension, and adjust the body from the horizontal position to a sitting position. If this does not help, the treatment should be stopped completely.

Sublingual administration of antihypertensive drugs such as Nifedipine (Adalat) may be considered, but need to be careful in their administration to avoid rapid decline in the blood pressure.

2. Difficulty in haemostasis in patients undergoing anti-coagulant therapy

The haemostasis in patients undertaking a course of antithrombotic therapy with agents such as warfarin can be complicated. A sufficient coordination with the medical doctor is therefore required. It is generally acknowledged that the tooth extraction should be conducted with continuing the pharmacotherapy with considering the possibilities of systemic complications arising.

There are still medical and dental practitioners who consider temporary termination of drug therapy to be important. "Consensus meeting for invasive treatment mainly a tooth extraction of antithrombotic therapy patients." (2.28.2009) was held by the Japanese Society of Dentistry for Medically Compromised Patient, acting as a central role, and with The Japanese Circulation Society. The conclusion of "continuing administration" was agreed with the dental practitioners, and was decided to conduct a campaign to circulate this idea. The reason for this was to place the importance on limiting the systemic risks as much as possible. Where the reduction in the dose is absolutely necessary, it should not be done by the dentist alone but the dose should be controlled with assistance from the medical doctor. The haemostasis in those with anticoagulant therapy can be complicated but this does not mean that haemostasis is impossible. In these patients haemostasis should be conducted carefully using tools such as electric scalpel, in step-wise manner.

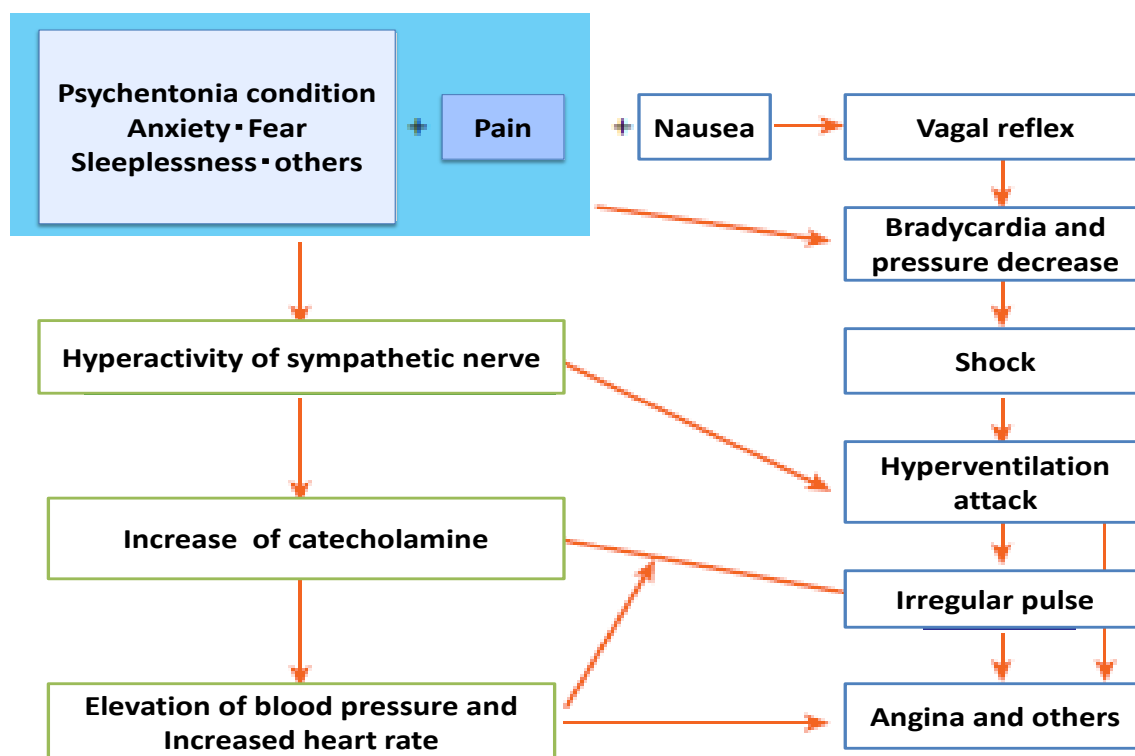


Fig. 3-5-7 The possibility of psychological stress and concomitant diseases

III. Postoperative accidents and complications and their treatment

A. Local accidental symptoms

1. Primary surgery

a. Bleeding

The amount of bleeding would be limited if haemostasis was done properly during the operation, which should only require pressurization to stop this. If there are no signs of the bleeding to stop even after 20 to 30 minutes, open up the wound to identify the source of bleeding and conduct haemostasis. With the individuals undergoing anticoagulant therapy, the treatment should not be conducted by the sole judgment of the dentist but with consultations by the medical doctor without discontinuing the medication. If the bleeding is still of concern, either adjust the administered dose, or consider concomitant use of haemostatic agent.

b. Swelling and pain

For any signs of swelling or pain, as this is most likely to be from the surgical intervention, it should be observed for a period of time, provided that the patient has been prescribed with antibiotics and anti-inflammatories. Where there is extreme pain felt, prescribe additional analgesics as required; as for swelling, sooth it with an application of cold towel. Instruct the patient to lie down with the area where the surgery was conducted, facing the ceiling.

If the swelling is a symptom resulting from infection, open up the wound site, for cleaning. Either continue with the course of antibiotics or change to another class. If the infection has spread to the surroundings structures of the implant, removal of implant may have to be considered.

c. Subcutaneous haemorrhage

Independent of the extent of perioperative bleeding, submucosal or subcutaneous internal blood spots can present after the surgery. The fact that this is not much of concern should be explained to the patient as before the surgery. If it becomes an issue however, consider thermotherapy, electrotherapy or application of heparins (Hirudoid); or suction of the source of bleeding.

d. Dysaesthesia

Upon confirming dysaesthesia in the chin region due to excessive insertion of the fixture with radiograph, either the implant must be lifted up slightly, or completely extracted.

In the initial stages of the presentation of the symptoms, pharmacotherapy using agents such as steroids or neurotropic drug; or low power laser therapy, a type of physiotherapy, are used. If the condition persists without any signs of improvement, stellate ganglion block may need to be employed early, and the specialist must be consulted immediately.

The therapeutic effect is improved if it is given as soon as the symptoms present. The effectiveness is at its upmost if treated within a month from the presentation of the symptoms, and the more period of time left, the efficacy for conditions such as lesion becomes less likely to be cured. It can be concluded that the therapy should be conducted as early as possible, and not to neglect the condition lightly, as the observation alone will not enable recovery.

< Pharmacotherapy >

The pharmacotherapy should be conducted with the aim to activate and regenerate the nerves from bradyaesthesia or dysaesthesia. Where there are no organic dysfunction, only imperceptions, generally, multi-vitamin or ATP preparations. In addition, where a secondary inflammation is thought to occur as a result of surgical invasion or compression of the nerves, concomitant administration of steroid agents in a tapering is given for anti-edema and anti-inflammatory effects (Table 3-5-3).

For the hypersensitivity symptoms that present, associated with the chronic paralysis, “tingling” or “prickling”, the antidepressant has been noted to be effective for the activation of the serotonin and adrenergic fibers that have been subjected to descending inhibition.

< Physiotherapy >

It is often combined with the pharmacotherapy to promote blood flow. Typically, Transcutaneous Electrical Nerve Stimulation Therapy (TENS) (Fig. 3-5-8) or by spot linear polarized light instrument, Super Lizer (Tokyo Iken Co., Ltd. Fig. 3-5-9) are used.

< Stellate ganglion block >

Stellate ganglion is located on the ventral of transverse process of seventh cervical vertebra and transverse process of first thoracic vertebra. This ganglion is placed in between the prevertebral layer and carotid artery sheath, and it is for this reason that when the drug is injected with the needle point to be in contact with the transverse process, the liquid drug spreads throughout the compartment that is contained between the fascia, resulting in the blocking effect. The ganglion block results in the increased blood flow to the facial region, for the regeneration of the nerves. The repetitive course of this treatment, typically 20 times, should be conducted to obtain efficacy from the treatment (Fig.3-5-10).

Imperception only

1. Multivitamin preparation : vitamedin 150 mg (Divided it into 3 times)
2. ATP formulation : adetphos 180 mg (Divided it into 3 times)

Nerve compression • Spread of inflammation

Steroid : Predonine 30 mg (morning 20, noon 10) → 20 mg (morning, noon 10) → 10 mg (morning, noon 5) → 5 mg (morning) (2 days each)

Hypersensitivity reaction, except paralysis

Antidepressant : Tryptanol 30 mg / day

Table 3-5-3 Examples of pharmacotherapy prescription



Fig. 3-5-8 TENS



Fig. 3-5-9 SUPERLIZER



Fig. 3-5-10 SGB

e. The dehiscence and infections to the wound

The dehiscence of the wound can result in exposure of the healing cap. Provided that this does not result in infection, it can be managed by instructing to clean the area of dehiscence, with a regular monitoring of the condition. If the area surrounding the healing cap does get infected, open up the wound to perform curettage of the infected granulation tissues to clean the area and then exchange the healing cap.

2. Secondary surgery and prosthetics

a. Looseness of fixture

Incomplete integration of the fixture often causes a slight discomfort in the placement of the fixtures even if loose movements were not observed with the fixture at the stage of secondary surgery. This should be managed by closing the wound again to allow consolidation for a period of few months. However, consider removal of fixture where a clear looseness of the fixture, was found that was associated with pain.

b. Fracturing of fixture

The fracturing of the fixtures have been known to result from the overload from the occlusion after the placement of superstructure (Fig. 3-5-11,12). This should be extracted with utmost care using tools such as trephine bur.

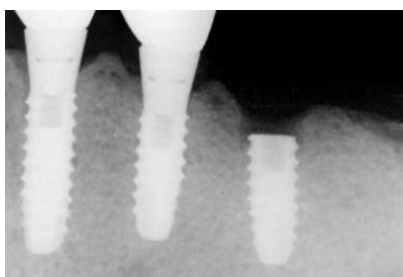


Fig. 3-5-11 Fracturing of the fixture



Fig. 3-5-12 Fractured implant.

B. Systemic accidental symptoms

1. Infection

Infection does not arise where a sufficient infectious control has been conducted prior to the operation, alongside conducting preventative measures after the surgical procedures. However, in those patients with underlined immune disorders such as diabetes, in whom the postoperative control of blood glucose level were not managed, they become more prone to contracting the infections and present with significant bone resorption (Fig. 3-5-3-15,16). In the progress of the infection, the severity of the conditions can result in an unexpected infectious state. The systemic conditions have to be fully comprehended for the patients with underlining disease conditions, and communicate with the medical doctor in charge of the patient.



Fig. 3-5-13 Draining of the swelling pus from those surrounding the implant



Fig. 3-5-14 Infection of the implant body



Fig. 3-5-15 Bone resorption around the implant



Fig. 3-5-16 Oroantral fistula to have resulted from infection of the implant

IV. Preventative measures for accidents and complications

In conducting oral surgery, as a general not specific for implant, infection can occur regardless of the preventative controls that have been implemented. The examination prior to surgery should be done in order to construct a plan that is suitable. Furthermore, a full comprehension of where the accidental symptoms or where the complication arise is required, having covered the management strategies.

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