Chapter 3 - Indication and contraindications of implant treatment

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I. Assessing the suitability of the case for implant treatment

The implant treatment has become widely applied globally, and has become acknowledged as the general dental treatment procedures. The 21st century can be said to be the shift in the predominance by the denture treatment to implant treatment and should be considered as the treatment option for the cases of tooth loss. The recent advances in the medical care have enabled control of various systemic diseases and help the patients in the everyday life and have lengthened their survival. Although various information regarding the patient have to be gained via an intimate communication with the doctor in charge of the patient, it is the role of the dental practitioner to analyze the gathered information, grasp the patient condition in order to judge the suitability of the implant treatment. Regarding the localized bone quantity and quality determined from the imaging analysis gave been discussed in the previous chapter therefore will mention of the analysis of the systemic indications.

The knowledge and understanding of the values of basic systemic analyses that frequents the scene of blood tests (Table 2-3-1) are essential. I will not go into depth, but these numerical values act as important indicators, not only for the suitability of the implant treatment, but also the postoperative infections, and predict any problems to arise with the wounding healing process. The Table 2-3-2 shows the risk classifications for the invasive procedures that have been utilized in the outpatient hematology clinic in the Department of dental surgery, Tokyo Medical University Hospital. In the risks classed in terms of likeliness of infection and bleeding, Class I, indicate normal level, and Class II required caution, but where there are no other abnormal signs, surgery can be performed. Whereas with the Class III should be dealt with the possibility of delaying the surgical procedure. The ranges of the values should be interpreted such that the reduction in the level of total protein or albumin should indicate decrease in the rate of wound healing, or diabetes should be suspected where an abnormal level of HbA_{1c} has been presented.

II. Contraindications

The implant treatment has been said to be one that has no absolute contraindications, however there are cases amongst the systemic disease where the perioperative and postoperative managements become complicated. In order to limit the risks to the minimum, and to maximize the success of the treatment, it is essential to communicate with the doctor specializing in internal medicines, and fully understand the systemic conditions of the patient from the information gained in order to judge the suitability of implant

treatment.

A. Systemic contraindications and conditions where special attention is required

1. Systemic contraindications for general implant treatment

① Severe blood diseases (hemophilia etc.)

	Contents	Normal level
Hematologic test	White blood count (WBC)	3,000～8,000 /μl
	Neutrophil	42～74%
	Red blood count (RBC)	3,700,000～5,400,000 /μl
	Hematocrit (Ht)	34.0～49.0%
	Hemoglobin (Hb)	11.0～17.0 g/dl
	Blood platelet count (PLT)	150,000～350,000 /μl
Biochemical test	GOT	8～38 U/l
	GPT	4～44 U/l
	γ- GTP	16～73 U/l
	LDH	106～211U/l
	Total protein	6.6～8.2 g/dl
	Albumin (ALB)	4.0～5.2 g/dl
	Urea nitrogen	8.0～22.6 mg/dl
	Creatinine	0.6～1.1 mg/dl
	Blood sugar	60～110 mg/dl
	HbA_{1c}	4.3～5.8%
Coagulation test	PT-INR (PT: Prothrombin Time)	1.0 ± 0.1
	Activated partial thronboplastin time (APTT)	30.0 ± 5.0 seconds
	FDP	< 4.0 μg/ml

Table 2-3-1 Examination criteria

		I	II	III
1. White blood count**		> 2000	2000-1000	<1000
2. Neutrophil count*		> 1000	999-500	< 500
3. Blood platelet count**		> 150	149-50	< 50
4. Hb***	male	> 12	12-10	< 10
	female	> 10	10-8	< 8
5. PT-INR		< 1.2	1.2-1.5	< 1.5
6. APTT		Normal	Delay < 30 %	Delay > 30 %
7. FDP		Normal	Slight outlier	High outlier
8. Hepatorenal function		Normal	Slight outlier	High outlier

(*/μl, ** $\times 10^3$/μl, *** mg/dl)

Table 2-3-2 Risk classifications for invasive procedures

The patient is to be classed in the high category if even one factor fits with the criteria.

② Myocardial infarction: within six months of an attack
③ Cerebral infarction and cerebral apoplexy: In cases where the condition of the disease is serious and the patient are concurrently taking anticoagulants.
④ Severe immunodeficiency
⑤ Patients who are undergoing strong chemotherapy
⑥ Severe neuropsychiatric disease, mental disability, and narcotic drug addicts
⑦ Patients who are concurrently taking bisphosphonates
⑧ Youths under the age of 15

2. Systemic conditions that require special attention in implant treatment

Be aware of any postoperative infection, abnormality in blood coagulation, and of any delay in wound healing.

a. In case of bleeding

(1) Idiopathic thrombocytopenic purpura

It is necessary to note the number of platelets, as the long-term steroidal uses have been associated with osteoporosis.

(2) Aplastic anemia and leukemia

In addition to concern as to the postoperative infection and bleeding, the future treatment plan should be re-considered.

(3) Hemophilia

Bleeding during the procedure can be controlled with the application of blood products in the case of mild hemophilia, but corporation of the medical doctor is required. The outcome of these cases have not been satisfactory, and they have often resulted in the falling out of the fixtures

(4) Patients taking anticoagulants (proprietary name Warfarin)

Decide on the suitability of implant treatment using the PT-INR[*1] as the reference.

(5) Patients taking antiplatelet agents (proprietary name Bayaspirin, Bufferin for children, Panaldine, Plavix, and Pletaal)

Monitor the blood platelet count and their functions. The reduction in the platelet counts can result in bleeding and abnormal blood coagulation.

b. In case of infection

This is of particular importance to consider in the patients with leucopenia, and HIV but the incidence of postoperative infection has been found to be the highest in diabetics. Whether the diabetic patient is undergoing oral medical treatment or with insulin injection can determine the extent of the condition, however, the control of the illness is the requirement for conducting implant treatment. HbA_{1c} less than 7% indicates well controlled condition, and range between 7 and 9% been indicated to be the general range.

c. Osteoporosis

Not all of osteoporosis are contraindicated for implant treatment. Bone density measurement may be necessary in some cases but it has been reported that normal level of bone metabolism is still possible

with only a third of the regular amount. The concomitant use of bisphosphonates as the treatment drug has led to an accelerated number of cases resulting in jaw bone necrosis in the recent years therefore the implant treatment has become contraindicated in patients currently undergoing a course of bisphophonates.

d. Angina pectoris

The implant treatment has been indicated for patients who have not had the attack within the last one to two months, or even then if the condition is considered to be relatively light, the treatment is still possible. In the case of frequent angina attacks, it might be best to avoid undergoing surgery. In any case, the decision and treatment planning should be conducted with the medical doctor in a coordinated manner.

e. Myocardial infarction, cerebral infarction and stroke

The implant treatment can be performed for those who have not had heart attack in the last six months, without presentation of any complications. As for the cases of cerebral infarction and stroke, the suitability of the implant procedure should be judged on the disease state and the medications. In any case, the decision and treatment planning should be conducted with the medical doctor in a coordinated manner.

f. Hypertension

Hypertension is diagnosed when the systolic blood pressure (BP) becomes over 140 mmHg and the diastolic BP becomes over 90 mmHg (140/90 mmHg). These patients should be referred to the medical doctor nearby for the BP control, before initiating the implant surgery. During surgery, measures such as the administration of minor tranquillizers from the day before, or relaxing the patient during surgery to avoid the rise in the BP are necessary.

The patient should be monitored for their BP, pulse and use electrocardiograms, and the implant surgery may best be discontinued if the BP rises over 200/120 mmHg.

The conventional sublingual administration of nifedipine (product name Adalat) has been contraindicated as a general rule for the implant treatment due to the risk of inducing rapid fall in BP and reflex tachycardia. If the use is inevitable, an antihypertensive that has been indicated for cases of emergency via intravenous administration should be applied (E.g. continuous infusion of perdipine (product name) at 0.5μg/kg/min).

g. Uncooperative patients

This is evidently not a systemic condition, even then intraoperative and postoperative managements can be made difficult.

*1 As a screening test procedure, the platelet count (Normal range: 15- 35$\times 10^4/\mu$l), PT (prothrombin time, normal range: 10- 13 sec) and PTT (partial thromboplastin time, normal range: 28 to 34 sec) have been the standard values for analysis in the past, but the standard reference has been shifted to the use of international normalized ratio (INR) that is calculated from the PT. The INR is the ratio of a patient's prothrombin time to a normal (control) sample, raised to the power of the ISI value for the analytical system used. A normal person has the INR of 1.0. Provided that the platelet count and APTT values are within the normal range, hemostasis is possible in small invasive surgery by the application of suture,

electrocoagulation or with local coagulants (thrombin, gelatin, oxidized cellulose) even if the INR value is 1.5 to 2.5 (to be more precise, <3.5)

B. Local contraindications and conditions where special attention is required

1. Contraindications of local conditions for general implant treatment

① Insufficient bone quantity, but where bone augmentation procedures with bone graft is not possible.

② Intractable periodontitis and serve periodontal disease (cases where improvements in oral hygiene does not recover the disease condition)

③ High exposure to radiation

④ Chronis osteomyelitis

2. Localized conditions that require special attention in implant treatment

① Mouth-closing disorder (temporomandibular joint disorder, temporomandibular joint ankylosis, post-tumour resection)

② Bruxism

③ Smoking (heavy smoker)

④ Drying of oral cavity (dry mouth, Sjögren syndrome, and other xerostomias)

⑤ Poor oral hygiene

⑥ Uncooperative patients who have no understanding of the need for a regular follow-up.

References

1) Suda T, Ozawa H, and others eds. Bone Biology. Tokyo. Ishiyaku Pub, Inc. 2007. (in Japanese)

2) Igari J, Nakahara K eds. Standard Laboratory medicine. Tokyo. Igaku-Shoin Ltd. 2006. (in Japanese)

3) Yamazaki M, Takahashi T, and others. Ultimate Guide IMPRANTS. Tokyo. Ishiyaku Pub, Inc. 2006.(in Japanese)

4) Watzek G: Implants in Qualitatively compromised bone. Quintessence Publishing Surry, UK, 2004.

5)Renouard F, Rangert B. （Translation by Maeda Y, Yonehata Y.） Risk factors in implant dentistry. Tokyo. Quintessence Publishing Co., Ltd. 2000. (in Japanese)

6) Misch CE: Bone density; a key determinant for clinical success. Contemporary implant dentistry, 2nd ed, Mosby, St Louis, 1999.

7) Lekholm U, Zarb GA: Patient selection and preparation. In Branemark P-I, ZarbGA, Alberktsson T(eds). Tissueintegrated prostheses: Osseointegration in clinical Dentistry. Quintessence, Chicago, 1985.