



Canadian Dental Patients with a Single-Unit Implant-Supported Restoration in the Aesthetic Region of the Mouth: Qualitative and Quantitative Patient-Reported Outcome Measures (PROMs)

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Abstract: This article contains quantitative and qualitative patient-reported outcome measures (PROMs) collected from nine dental patients, with a single-implant in the maxillary anterior region of the mouth, recruited after obtaining consent documents. The quantitative data were obtained from participants' demographics, frontal extraoral digital photographs, intraoral scans (IOS) of the maxillary arch, and self-administered questionnaires (where patients judged the overall, appearance, function, and comfort of their single-implant-supported crowns). Objective single-implant aesthetic index mean scores (Pink Esthetic Score/White Esthetic Score [PES/WES]) were obtained after two experienced calibrated clinicians analyzed the photographs and the three-dimensional models generated from the IOS. The self-administered questionnaires used a visual analogue scale (VAS) to obtain the patients' subjective perceptions. The qualitative data were obtained from in-depth, semi-structured one-to-one interviews. The transcriptions from audio-recorded interview data were managed and coded, with the aid of a Computer-Assisted Qualitative Data Analysis Software (CAQDAS). These data were stored in a public repository that can be easily downloaded from a Mendeley data repository (DOI: 10.17632/sv8t6tkvjv.1).

Dataset: DOI: 10.17632/sv8t6tkvjv.1

Dataset License: CC-BY

Keywords: aesthetic dentistry; esthetics; implant dentistry; patient-reported outcome measures; patient perception; personal satisfaction; qualitative research; single-tooth dental implants



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1. Summary

The specific subject areas of this research fall under the umbrella of “Dentistry, Oral Surgery and Medicine” as well as “Medicine and Dentistry (General).” The parameters for data collection were adult dental patients who were at the maintenance stage after receiving an implant-supported single-crown in the upper front region of the mouth, and who lived in the province of British Columbia (Pacific Coast Region-West Coast), Canada.

Since the study aimed to provide a deeper understanding of the phenomenon (i.e., patients' experiences and perceptions with a single-tooth implant in the anterior zone), this study required a holistic assessment using an inductive qualitative method. Consequently, an adapted form of interpretative phenomenological analysis (IPA) was conducted [1–3].

Additionally, the researchers (K.I.A. and S.R.B.) subscribed to van Manen's recommendation for a dynamic interaction between six research steps that allowed flexibility in working intermittently or simultaneously, back and forth between steps, as a form of an "interpretative circle," depending on the evolving research needs [4,5]. The framework proposed by van Manen included the following steps: "turning to the nature of lived experience," "investigating experience as we live it," "reflecting on the essential themes that characterize the phenomenon," "describing the phenomenon in the art of writing and rewriting," "maintaining a strong and oriented relation to the phenomenon," and "balancing the research context by considering the parts and the whole" [6]. The results of this qualitative study were interpreted and presented by arranging them as themes and subthemes, relating these to the "whole", relative to understanding the phenomenon in question.

Regarding the description of the data collection, qualitative interviews, self-administered questionnaires, maxillary digital scans and the lower third of the face pictures were obtained in a university setting. The participants were encouraged to express their perspectives about a specific dental intervention, as well as to recall their satisfaction throughout the process. The participation of nine Canadian dental patients was incentivized, and all data was anonymized. The format of the table and chart data available are raw, analyzed, descriptive, and cleaned.

The data can serve for further investigation of the expectations, perceptions, and satisfaction with the treatment outcomes, of patients who had a missing tooth replaced by an implanted single crown in a university setting in Western Canada. This is the first time that qualitative data from this particular sector of the dental population have been reported.

The data can aid other investigators by comparing data from different regions of Canada or different countries, as well as data from patients treated at a university by postgraduate students and at a private practice by more experienced dental specialists. Additionally, the results may benefit from an analysis according to the available theories of patient satisfaction. Moreover, the raw data can be used for further analysis or for combining the results of the quantitative measures with new studies for meta-analytical purposes. The self-administered questionnaire can be used in other studies for its validation and for benchmarking purposes. The qualitative responses can be analyzed with qualitative software to uncover patterns and commonalities in the experiences of patients who had a single-implant crown in the upper front area of the mouth.

The data shared provide information about areas of improvement regarding the quality of care provided to patients who are missing a tooth in the most visible area of the mouth. The data may inspire other practice variation studies to understand satisfaction of partially edentulous patients. Lastly, a concise questionnaire related to PROMs of patients with a single-implant crown in the anterior zone was specially designed for this research project and is presented here in English.

2. Data Description

The dataset in this research article contains the data from nine (55.6% men) adult patients who had a missing tooth replaced with a single crown supported by an osseointegrated titanium implant performed by postgraduate students from the Periodontology and Prosthodontology departments at a Canadian educational institution. The number of included participants was aligned with the estimation stipulated in the study protocol [6], which was based on achieving the research data saturation of previous qualitative studies, including between six and twelve individual interviews [1,7–10].

After informed consent was obtained from all subjects involved in the study, their records were verified for the presence of a tooth removal information and a consent form (Figure 1), regeneration surgery information and a consent form (Figure 2), a dental implant therapy consent form (Figure 3), bone grafting surgery post-operative instructions (Figure 4), and oral surgery post-operative instructions (Figure 5).

I have been informed of the need for dental extraction (the removal of a tooth or several teeth). The reasons for this extraction have been explained to me by my resident during the treatment plan discussion.

SUGGESTED TREATMENT: It has been suggested that the tooth/teeth indicated below be removed:

RISKS RELATED TO THE SUGGESTED TREATMENT: Risks related to tooth removal surgery might include, but are not limited to, post-surgical infection, bleeding, swelling, pain, infection, facial discoloration, transient but on occasion permanent numbness of the lip, teeth, chin, or gum, jaw joint injuries or associated muscle spasms, fracture of the tooth/teeth during surgery, retention of part of a tooth or roots, dislodging of a tooth or part of tooth into the upper jaw sinus, swallowing of a tooth or fragments of a tooth, sensitivity to hot or cold or sweets or acidic foods, or shrinkage of the gum upon healing. Risks related to the anesthetics might include, but are not limited to, allergic reactions, accidental swallowing/aspiration of foreign matter, facial swelling or bruising, pain, soreness, or discoloration at the site of injection of the anesthetics.

ALTERNATIVES TO THE SUGGESTED TREATMENT MAY INCLUDE: No treatment, with the expectation of the advancement of my condition resulting in greater risk or complications including, but not limited to, bone loss, pain, infection, and possible damage to the support of adjacent teeth.

1. I have been informed and I understand the purpose and the nature of the tooth/teeth removal that will be performed.
2. I have been informed and I understand that occasionally there are complications of surgery including the above mentioned but not limited to.
3. It is my responsibility to seek attention should any undue circumstances occur post-operatively and I should diligently follow any pre-operative and post-operative instructions.
4. I give permission to photography and/or video recording of this procedure for treatment planning, documentation of my ongoing care, teaching and research.
5. To my knowledge, I have given an accurate report of my physical and mental health history and current condition. I have reported any allergies, illnesses, diseases, and any other considerations related to my health. I hereby state that I read, speak, and understand English.
6. I have the opportunity to read this form, ask questions and have my questions answered to my satisfaction. I hereby consent to the removal of the above mentioned tooth/teeth and I understand unforeseen circumstances may necessitate a change in the desired procedure or in the rare cases, prevent completion of the planned procedure.

Signature of Patient (parent or legal guardian)

Print Name

Date

Signature of Witness

Print Name

Signature of Doctor

Print Name

Figure 1. Tooth removal information and consent form.

Periodontal (gum) disease is caused by plaque (bacteria). In periodontal disease, bone and supporting tissues surrounding the roots of your teeth are destroyed. Periodontal disease can vary as to the number of teeth that are affected, which teeth are affected, as well as the specific pattern of bone and tissue loss around the teeth.

In some specific cases of bone loss due to periodontal disease, it may be possible to reverse some of the damage that has occurred to the bone and supporting tissues. That is, it may be possible to stimulate and/or enhance the natural healing ability of your body to regenerate (regrow) bone and tissue. A variety of materials including special membranes, bone grafts or stimulating proteins may be used to encourage regeneration.

Your Resident and Clinic Instructor will carefully examine your radiographs (x-rays) and the pockets around your teeth; they will use this information to determine if Regeneration Surgery is possible. However, the final decision to actually place regeneration materials must often be made at the time of surgery when the pattern of bone loss around the roots can be examined directly. If your Resident and Clinic Instructor determine that regeneration attempts are unlikely to be successful, then the regeneration material will NOT be placed during the surgery.

During Regeneration Surgery, your Resident will fold back the gum tissue from around the teeth to provide direct access to the roots and surrounding bone for a careful inspection and a further smoothing of the roots. Your Resident and Clinic Instructor will carefully evaluate the pattern of bone loss around the roots to determine if regeneration materials may be placed for a favorable outcome. However, **NO guarantees** may be provided as to the amount of bone and tissue that will be regenerated; healing and regeneration depend upon multiple factors that are beyond the control of a periodontist.

A variety of regenerative materials may be used and these options will be discussed with you by your Resident BEFORE the Regeneration Surgery is scheduled. The cost of the regenerative materials depends upon the type of material used and the cost of these materials is a cost that is separate and in addition to the cost of the surgery. If the regeneration materials are not placed or used during the surgery, you will NOT be charged for the materials.

After Regeneration Surgery you may notice the following:

- There may be some shrinkage (recession) of the gum surrounding the teeth so that more tooth and root structure may be visible above the gum line. If your teeth have crowns (caps), the edges of the crowns, where the crown meets the tooth, may now be visible and sometimes these crown edges have a dark color.
- There may be more space (embrasures) between your teeth, underneath the contact area between adjacent teeth. This is known as increased embrasure space. It may be easier for food to be caught between your teeth, but it will now be easier for you to clean between your teeth.

Patient's Initials: _____ Doctor's Initials: _____

- Your teeth may be sensitive after the surgery. Sensitivity may be present to hot, cold, sweet and sour. This sensitivity usually fades over time. Your Resident may provide desensitizing treatments if necessary. Even if your teeth are sensitive, it is very important for you to maintain good oral hygiene: inadequate cleaning of your teeth will permit plaque (bacteria) to build up around your teeth and this will worsen and prolong the sensitivity.
- You may notice an increase in the looseness (mobility) of your teeth. This is usually a temporary condition. However, if you are performing jaw habits such as grinding or clenching your teeth, the mobility may worsen and continue. You must inform your Resident if you suspect or are aware of performing jaw habits.
- For some teeth with large fillings or crowns, there is a slightly increased risk of these teeth becoming non-vital (dead) and requiring root canal therapy. If you experience any swelling or pain around your teeth or gums, contact your Resident.

Good oral hygiene is required for proper healing to occur and healing of the surface gum tissue is usually complete within 4-6 weeks. However, regeneration activity can continue for an extended time and it is very important for you to adhere to the recommended schedule for your Supportive Periodontal Care (regular maintenance cleanings). Your Resident will advise you.

1. I have been informed and I understand the purpose and the nature of the Periodontal Regeneration Surgery that will be performed to decrease pocket depths around my teeth and to regenerate the bone lost around my teeth.
2. Graft material will be placed in the areas of bone loss around the teeth. The bone graft that will be placed can either be of animal origin, human origin (other than my own), my own bone or a synthetic bone substitute. Membranes may be used with or without the graft to assist in regeneration. The membrane material that might be used is derived from animal sources or it can be synthetic. These grafts and membranes are thoroughly purified by different means to be free from contaminants. Sometimes, host modulating agents like Enamel Matrix Protein (Emdogain (animal origin) can be used for regeneration. Signing this consent form gives my approval for the Resident and the Clinic instructor to use such materials according to their knowledge and clinical judgment for my situation. I consent to the use of such material with the exception of _____ (_____) (Patient's initials).
3. It is understood that although the success rate of periodontal regeneration is high, incorporation of the bone graft with my own bone cannot be and or not implied guaranteed or warrantable. There is also no guarantee against unsatisfactory or failed results. I also understand that the final decision on whether bone regeneration will be performed or not, will be made during the surgery.

Patient's Initials: _____ Doctor's Initials: _____

4. I have been informed and I understand that occasionally there are complications of surgery including the above mentioned but not limited to.
5. It is my responsibility to seek attention should any undue circumstances occur post-operatively and I should diligently follow any pre-operative and post-operative instructions.
6. I give permission to photography and/or video recording of this procedure for treatment planning, documentation of my ongoing care, teaching and research.
7. To my knowledge, I have given an accurate report of my physical and mental health history and current condition. I have reported any allergies, illnesses, diseases, and any other considerations related to my health. I hereby state that I read, speak, and understand English.
8. I have the opportunity to read this form, ask questions and have my questions answered to my satisfaction. I hereby consent to this Periodontal Regeneration Surgery and I understand unforeseen circumstances may necessitate a change in the desired procedure or in the rare cases, prevent completion of the planned procedure.

Signature of Patient (parent or legal guardian)

Print Name

Date

Signature of Witness

Print Name

Signature of Doctor

Print Name

Figure 2. Regeneration surgery information and consent form.

1. IMPLANT SUCCESS. It has been explained to me that implants are not 100% successful and that there is no method to predict healing capabilities in each patient. I understand that the success or failure of my implant(s) will determine the final design of the restoration(s) placed in my mouth, and whether the restoration(s) will be permanently fixed to the implants or will be removable by me. I also understand that smoking may decrease the chances of implant success and that I must follow the home care instructions I am given at each stage of treatment.

2. TREATMENT. I understand that I will have to avoid wearing my denture(s) for 1-2 weeks after implants are first placed and then use them carefully for several weeks until healing is complete. After an initial healing period of 4 to 8 months following implant placement, a second surgical procedure will be performed to expose the implants and attach extensions onto them called abutments. After this second surgery, I may need to go another 1-2 weeks without wearing my denture(s). The prosthodontic (restorative) phase of my treatment will take place over a series of several appointments after the second stage surgery.

I consent to the administration of anesthetics or sedative drugs if prescribed and agree not to operate a motor vehicle or hazardous device for at least 24 hours after the administration of drugs or anesthesia.

I consent to photographic or video recording of any aspect of my implant treatment or follow-up care and I understand that these records may be used in dental publications and seminars for scientific purposes and to document the progress of my care.

3. ALTERNATIVES TO IMPLANTS. I have considered the following alternatives to implant treatment:

1. No treatment
2. Construction of conventional complete or partial denture(s)
3. Tooth replacement with conventional bridgework using my remaining teeth (if possible)

4. RISKS OF IMPLANT TREATMENT. I have been informed and I understand that the risks of no treatment include, but are not limited to, continuing use of removable complete or partial dentures with associated potential for discomfort and shrinkage of the jawbones which would necessitate periodic relining or remaking of the denture(s); periodontal disease and/or infection which could lead to the loss of teeth if not treated; and tooth decay, which could also lead to the loss of teeth if not treated.

I understand that surgical risks include, but are not limited to, pain, swelling, bruising, infection, bleeding, injury to teeth present, adverse drug reactions, discomfort, damage (temporary or permanent) to the nerve that gives feeling to the lower lip which could result in numbness or tingling or other sensations in the lower lip, bone fracture, jaw joint injury, delayed healing, injury to the sinus, ongoing risk of jaw fracture after final restorations are placed in very thin jaws, or loss of one or more implants. I also understand that my body may react adversely to the stress of a surgical procedure, with cardiac arrest being the most serious, but remote, possibility.

I understand that prosthodontic risks include, but are not limited to, failure of an implant (may be immediate or delayed), fracture of the restoration(s) and/or implant components, wear of the restoration requiring remake, difficulties with speech and/or chewing, compromised esthetic or functional outcome as a result of implant loss or less than ideal angulation or position of the implant(s). Unusual angulation or positioning of the implants may necessitate either more complex and therefore, more expensive, prosthodontic treatment than what has been planned or, possibly, result in one or more of the implants not being used to retain the prosthesis.

I understand that failing implants would require surgical removal and may require additional prosthodontic procedures or the subsequent placement of additional implant(s).

continued over ...

5. NO GUARANTEE. No guarantee or warranty has been made to me that the proposed implant treatment will be 100% successful or that the final restoration(s) will be totally successful from a functional or appearance standpoint.

I understand that no medical or dental treatment is totally predictable and that this includes treatment with dental implants. I understand that because of unknown or unforeseen factors, further surgical or prosthodontic procedures beyond those described to me might be necessary and that the final fee for treatment may therefore be different from the estimate I have been given. I also understand that the long-term success of my proposed implant treatment requires that I perform the necessary hygiene procedures as directed and that I return for scheduled follow-up and recall appointments.

I understand that there will be additional ongoing fees for these required procedures to maintain the health and function of my implant restoration(s).

6. RETREATMENT. I understand that, provided I have attended for prescribed follow-up appointments and followed the home care instructions given to me following placement of implants, any retreatment which is considered appropriate by the Faculty due to implant or prosthodontic failure within 2 years of placement will be handled at _____ as follows:

I will not be charged for clinical services to replace the same number of implants and/or repair or replace the same type of prosthesis; I will pay for components and laboratory costs and I will be given an estimate of the anticipated charges before retreatment begins. I understand that this does not constitute a warranty but rather a statement of services, and that failure to attend prescribed follow-up appointments or to follow home care instructions following placement of the implant prosthesis means that I will assume all costs for any retreatment required. I will also assume all costs for any necessary retreatment due to implant or prosthodontic failure that occurs beyond this initial two year period. I further understand that this statement of services applies only to treatment provided at the _____ Oral Implant Clinic and does not apply should I pursue treatment elsewhere.

7. SUMMARY. To my knowledge, I have given an accurate report of my physical and mental health history and current condition. I have reported any allergies, illnesses, diseases, and any other conditions related to my health.

I read and understand English and I have read and understand all of the foregoing information.

I have had the opportunity to read this form, ask questions, and have my questions answered to my satisfaction. I hereby consent to the surgical and prosthodontic procedures for placing and restoring my implant(s).

Signature of Patient

(If the patient is unable to sign, or is a
minor, parent or legal guardian may sign)

Relationship to Patient

Signature of Witness

Signature of Doctor

Date

Figure 3. Dental implant therapy consent form.

IT IS GENERALLY RECOMMENDED THAT YOU GO DIRECTLY HOME & REST FOR THE DAY. AVOID ANY STRENUOUS ACTIVITY.

DISCOMFORT & MEDICATIONS: Bone Grafting Surgery (like other surgeries) can be associated with varying degrees of discomfort.

- If you received a prescription for pain or inflammation control, take the medication as directed. It is usually best to take the first dose while the surgical site is still anesthetized (numb). You should also take 600mg Ibuprofen up to 4 times/day.
- If you received a prescription for antibiotics take as directed until the medication is done, unless directed otherwise by your doctor.
 - **“WOMEN”** Antibiotics may make oral contraceptives less effective and it is recommended that another form of birth control be utilized during this time.

With prescribed medication, **DO NOT:** Consume alcohol, take over the counter medication (unless cleared by your doctor)

SUTURE:

- If sutures (stitches) are placed, they may be “resorbable” or “non-resorbable” and you will be informed accordingly. If “resorbable” they will dissolve on their own within 7-10 days. If “non-resorbable” they will be removed within 1-4 weeks.
- Do no attempt to remove sutures yourself unless told otherwise by your doctor.

MOUTH CARE:

- An ice pack should be applied to the face in the area of the surgery, 15-20 minutes ON and 15-20 OFF for 2-3 hours at a time. Repeat the same regimen 2-3 times a day for the first 2-3 days following surgery.
- **Do not** brush or floss your teeth the day of your surgery.
- **Do not** rinse your mouth the first day as it may promote bleeding. The day following surgery, begin using the anti-plaque rinse as prescribed (1 capful/mouthful in the morning and 1 capful/mouthful in the evening). Don't rinse vigorously but rather gently.
- Beginning on the 3rd day following your surgery, you may rinse your mouth with warm salt water (1/2 tsp. of salt to 6 oz. warm water) 2-3 times a day to aid in the healing process.
- On the day after surgery, begin to brush and floss ALL other areas of your mouth Very gently, avoiding the surgical site(s).

SWELLING/BRUISING:

- Swelling and/or bruising is not unusual following many procedures. It may reach its maximum at the 3rd post-operative day and slowly decrease thereafter. Black and blue marks may appear in a concentrated fashion up to the entire side of the eye, face and neck. This is usually not accompanied by significant discomfort and will subside within days. Any unusual/large swelling or hot, pulsating sensation should be reported to your doctor.

DO NOTS: for the next several days, **DO NOT:** spit, smoke, rinse hard, drink through a straw, create a sucking action in your mouth. These actions promote bleeding. Avoid caffeine, alcohol and tobacco and limit talking during the first 24 hours.

IF YOU HAVE ANY QUESTIONS OR REQUIRE ATTENTION DO NOT HESITATE TO CALL.

BLEEDING:

- Your may notice a slight oozing of blood from the surgical site(s). This type of MINOR bleeding for one or two days is not unusual and is not a major concern. If the bleeding does not stop or is excessive, please call the office for assistance.

NUTRITION:

- Do NOT eat or drink anything too hot for 1 week after surgery. Luke warm foods and fluids are acceptable during this time. On the day of surgery it is best to restrict your diet to fluids and very soft foods. For example...
 - Potatoes, eggs, milk shakes, oatmeal, Jell-o, soups, noodles, yogurt, beans, soft fruit/bananas, food supplements, pancakes, cheese, pudding, ground beef, ice-cream, casseroles, fish, rice.

The diet during the remainder of this first post-operative week should be softer in nature than your normal diet. However, you may eat food you desire. Avoid hard, chewy, fibrous or spicy foods, i.e. popcorn, flakey cereals, fresh garden salads and corn chips. Good nutrition is essential to healing so be sure to eat well-balanced meals during the course of treatment. It is also important to drink plenty of fluids during this time. *Please do not use a straw and avoid spitting.*

EXERCISE:

- Avoid strenuous physical activity during your immediate recovery period, usually 5-7 days. It is advisable not to work out for at least one week following surgery. Try to avoid sudden movement and bending during the first 4-5 days.

AIR TRAVEL:

- Avoid air travel for 4-5 days following the surgery (or longer if your doctor has suggested so). Pressure changes experienced during flying may cause bleeding and discomfort.

DO NOTS: for the next several days, **DO NOT:** spit, smoke, rinse hard, drink through a straw, create a sucking action in your mouth. These actions promote bleeding. Avoid caffeine, alcohol and tobacco and limit talking during the first 24 hours.

AIR TRAVEL:

- Avoid air travel for 4-5 days following surgery (or longer if your doctor has suggested so). Pressure changes experienced during flying may cause bleeding and discomfort.

DO NOTS: for the next several days, **DO NOT:** spit, smoke, rinse hard, drink through a straw, create a sucking action in your mouth. These actions promote bleeding. Avoid caffeine, alcohol and tobacco and limit talking during the first 24 hours.

Some bleeding or oozing up to 24 hrs after oral surgery is common. However, you can minimize this by:

Keeping your head elevated, using several pillows when asleep
 Firmly biting on moist gauze for at least one hour after surgery or until most oozing stops
 Limiting physical activity for the first day after surgery
 For persistent minor bleeding (over 6 hours) biting on a tea bag will help

Swelling

Some swelling occurs after most oral surgery and especially after wisdom teeth surgery. The amount of swelling is usually proportionate to the surgery performed and reaches its maximum in about 48 hours and diminishes. A small amount of residual swelling may persist a week or more after surgery. However, if swelling increases after that or is accompanied by drainage, please contact your dental student or doctor.

You can minimize swelling by:

keeping your head elevated, especially when sleeping
 Using ice or cold packs on the face adjacent to the surgery site during the first 12 hours after surgery. After that, cold will not be helpful.

Pain

Post-operative soreness or pain is common after oral surgery. In most instances it reaches a peak within the first 24 hours after surgery, then diminishes.

Normally you will be given either a prescription for pain medication or specific recommendations for non-prescription drug use. Please follow those instructions and if not adequately controlled, please call the student or doctor who treated you.

Diet

After initial bleeding stops, its best to ingest clear fluids such as apple juice, or broth the first day after the first day after surgery. Thereafter, a regular diet is satisfactory, provided you do not chew food on the surgical site until healing is complete.

Oral hygiene

Your surgical site must be kept clean in order to promote rapid healing and avoid infection. Starting 24 hours after surgery, rinse your mouth after every meal with lukewarm water containing 1 teaspoon of salt per 8 ounces water.

Avoid

Smoking, spitting, or drinking through a straw for at least 24 hours after surgery as these habits interfere with healing.

The following conditions may occur after removal of wisdom teeth

Pain with swelling and earaches
 Difficulty opening your mouth widely
 Numbness of your lip or tongue
 Minor realignment of adjacent teeth
 Soreness of the corners of the mouth
 Bruising of your face, neck and chin

If you have any concerns or an emergency during office hours please call _____

If your problem occurs during evenings or weekends please contact the student who performed the procedure

STUDENT NAME _____ PHONE # _____

If the problem is of a more serious nature please go to your nearest hospital emergency department

Figure 5. Oral surgery post-operative instructions.

The self-administered questionnaire used a visual analogue scale (VAS) to assess patients' satisfaction quantitatively after having their single dental implant in the front of the fully functional mouth, as previously proposed by Afrashtehfar et al., 2021 [11]. The raw data of the questionnaire contain patients' responses (Table 1) to each of the six items of the self-administered questionnaire. Mean values and standard deviations were calculated to obtain the overall scores from each participant and each question. The questionnaire included 6 items about the participants' perceptions of the single-tooth implant regarding: overall satisfaction, comfort, tooth appearance, gum appearance, function, and cleaning complexity [11].

Table 1. Participants' points of view (patients' subjective assessments) of their single-implant teeth.

Question ID	Participant ID *									Mean	SD
	1	2	3	4	5	6	7	8	9		
	A	B	C	D	E	F	H	I	J		
Q1	100	99	81	78	89	73	78	91	100	87.7	10.6
Q2	100	99	79	86	91	84	80	92	100	90.1	8.4
Q3	100	99	80	90	88	65	82	89	100	88.1	11.4
Q4	80	99	82	76	90	63	83	95	100	85.3	12.0
Q5	100	98	66	88	90	68	82	98	100	87.8	13.3
Q6	87	99	100	85	91	72	59	83	100	86.2	13.8
Mean	94.5	98.8	81.3	83.8	89.8	70.8	77.3	91.3	100	–	–
SD	8.8	0.4	10.9	5.6	1.2	7.5	9.2	5.2	0	–	–

Patients' points of view. ID = identification; SD = standard deviation. * To help preserve the anonymity of participants, precise ages are not provided.

The scores from the two calibrated clinical examiners (K.I.A. and K.I.) were averaged to obtain the objective assessment scores of each item evaluated (Table 2) according to the literature [11–13]. Five items for the tooth (WES) and gum (PES) portions of the implant tooth were evaluated, in a comparison of similarities with the contralateral natural tooth. The highest score (similar aesthetic outcome) received in each item was 2, whereas the lowest score (dissimilar aesthetic outcome) received was 0. Anything in the middle received a score of 1. Therefore, the maximum score that each evaluated portion could add up to was 10, and the maximum combined score was 20. Each portion that received a score of less than 6 and a combined score of less than 12 was considered an unacceptable aesthetic outcome [11,12]. In this group of participants, most (5/9) had an overall unacceptable aesthetic outcome (Table 2).

The primary data collected for this research project were qualitative participant perceptions gathered through semi-structured, one-to-one, in-depth interviews with each participant, using an interview guide based on open-ended questions [6], guided by the literature [14–18] on the subject and the research question. The interview guide consisted of six sections: introductory background questions (icebreakers); patients' overall satisfaction with their implant tooth, the appearance of their implant tooth, the function and social experiences relating to their implant-tooth; as well as any other important experiences which affected their satisfaction with their implant tooth, such as complications, maintenance, financial aspects, and surgical aspects of the implant tooth treatment. One author (K.I.A.) conducted all the interviews and discussed the obtained data with another author (S.R.B.). Thus, several questions were added to the original version of the guide as the interviews of the first participants evolved, creating an opportunity to extract more information about issues surrounding the research question [14] (Table 3).

Table 2. Expert evaluation (calibrated clinicians' objective aesthetics assessments) concerning the individual characteristics of the single-implant tooth appearance.

Participant ID *	Tooth Implant Site (FDI)	Pink Aesthetic Score					White Aesthetic Score					Total PES	Total WES	TOTAL PES/WES
		Mesial Papillae	Distal Papillae	Curvature of the Facial Soft Tissue Line	Level of Facial Mucosa	Root Convexity/Soft Tissue Colour and Texture	Tooth Form	Outline and Volume of the Clinical Crown	Colour	Surface Texture	Translucency and characterization			
1 A	21	1	0.5	0	1	1.5	0.5	0.5	2	1.5	0.5	3	5	8
2 B	11	1.5	1.5	1	2	1	1.5	1.5	1	2	2	8	8	16
3 C	21	1.5	1.5	1.5	1	1	1	1	1	2	1	6.5	6	12.5
4 D	22	0.5	1	1	1.5	0.5	1	1.5	1.5	1	1	4	6	10
5 E	22	2	2	1	1	0.5	0.5	0.5	0.5	2	1	7.5	4.5	12
6 F	22	1	2	1	1	0.5	0.5	1	1	1	1	5	4.5	9.5
7 H	24	1	1.5	1	1.5	1.5	26	24	2	1.5	1.5	6.5	7.5	14
8 I	22	1	1.5	1	0	1	60	22	0.5	1.5	1	4.5	4	8.5
9 J	21	1.5	0	1	0	0.5	66	21	1	1	0.5	3	3	6

Experts' points of view. PES = pink aesthetic score; WES = white aesthetic score; PES/WES: green = acceptable; red = unacceptable. * To help preserve the anonymity of participants, precise ages are not provided.

Table 3. Questions added to the interview guide during the data collection phase.

<p>Part 1: Introductory Background Questions (Icebreaker)</p> <p><i>How long ago did you come to lose your tooth?</i></p> <p><i>How did you get interested/motivated in dental implants?</i></p> <p><i>How did you come to make the decision?</i></p> <p><i>Were you provided enough information at school (dental specialty students) for deciding to have an implant?</i></p> <p><i>What was the most attractive idea about having an implant?</i></p> <p><i>How long did it take you to make the decision to have an implant?</i></p> <p><i>What information would you wish you had at the beginning to be better prepared before going for the implant?</i></p> <p><i>Did you investigate the risks of something going wrong?</i></p> <p><i>How comfortable would you be now if you needed a new implant in another place?</i></p>
<p>Part 2: Is about Your Overall Satisfaction with the Implant Tooth</p> <p><i>So, would you say the overall results were better or worse than expected? Why?</i></p>
<p>Part 3: Is about Your Satisfaction with the Appearance (or Look) of Your Implant Tooth</p> <p><i>Do you feel you received enough information about what to expect?</i></p> <p><i>What would you liked to have been explained better?</i></p> <p><i>Was the result better or worse than expected?</i></p>
<p>Part 4: Is about Satisfaction with Your Functioning and Social Experiences Relating to Your Implant Tooth</p> <p><i>Is there anything you expected to be able to do with your dental implant that you cannot? What? Why?</i></p> <p><i>After having the dental implant, has there been any kind of improvement in (1) confidence, (2) self-image/self-esteem, (3) social life? How? Could you give an example?</i></p>
<p>Part 5: Any other Important Experiences that Affect Satisfaction with Your Implant Tooth, such as Complications, Maintenance or Financial Aspects</p> <p><i>Was there any lip biting or discomfort immediately after the crown was implanted?</i></p>
<p>Part 6: Surgical Aspects of the Implant Tooth Treatment</p> <p><i>What were your feelings immediately after the surgery procedure?</i></p> <p><i>What can be improved for the future? (e.g., if you or your friend/relative had the procedure)</i></p> <p><i>Please describe your recovery from the implant surgery.</i></p> <p><i>Do you feel you received enough information about the recovery process?</i></p> <p><i>Was the recovery process better or worse than expected?</i></p> <p><i>What was the worst part of your implant experience?</i></p> <p><i>Did you have any complications during the surgery or healing period?</i></p> <p><i>Did you have other issues such as pain or distress during the healing period?</i></p> <p><i>How long did the implant take?</i></p> <p><i>How long do you expect your implant to last?</i></p> <p><i>Do teeth or implants last longer?</i></p> <p><i>What is peri-implantitis?</i></p> <p><i>Can implants get infected?</i></p> <p><i>Are teeth or implants more resistant to infections around the bone and gums?</i></p>

Repository qualitative answers to the interview are available at: <http://dx.doi.org/10.17632/sv8t6tkvjv.1#file-ab78ccce-788c-4913-8daa-3334b8dfcc4d> (Accessed date: 19 June 2021). This repository [19] contained several coded sections displayed as tables according to the chronological events during the treatment and the meanings conveyed by the prevalence of the identified expressions of the participants.

3. Experimental Design, Materials and Methods

The designed questionnaires were used to explore patients' perceptions and satisfaction with their implant treatment experience and the treatment outcome. The patients who volunteered to participate, read and signed an informed consent form (Table 4) which stated that they could withdraw from the study at any given moment without consequences and ensure their anonymity. The data collection has been conducted in one university dental clinic in the Pacific region of Canada.

Table 4. Consent form.

<p>This study is part of the research project at the Faculty of Dentistry. Results of the study will be written up for publication in a scholarly journal.</p>		
<p>Purpose of our study: You have been invited to participate in this study at the Faculty of Dentistry to explore your perceptions and experiences with a single dental implant in the front of the mouth.</p> <p>What will happen? We will take a dental impression of your upper teeth in addition to two clinical pictures of your teeth. We will also ask you questions about comfort and satisfaction with your implant tooth. If you agree, we will use audio recorders to help us document your opinions, and we will give you an opportunity to read and modify the word transcript of the interview. The visit to the clinic and interview will require up to two hours of your time.</p> <p>Risks and benefits to you: The interview will ask you to think about the comfort and satisfaction of your mouth and implant tooth during usual daily activities. By participating, you will have an opportunity to express your thoughts and feelings. However, we are not able to take a treatment role in this study, so if you need to, we would recommend that you return to your existing dentist for any follow-up.</p> <p>Confidentiality: Your participation and all information that you give us will be confidentially stored on two password-protected and encrypted laptop computers. These will be available only to the investigators. You will not be identified personally in any of the reports of the study and the statements will only be identified by a pseudonym (not your real name). All of the recordings and study data will be deleted ten years after publication of the project.</p> <p>Compensation: As an honorarium for your participation, we will pay you CAD xx.00 at the end of the interview.</p> <p>Contact information: If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the Office of Research Ethics: e-mail xxxx@xxx.ubc.ca or call toll free x-xxx-xxx-xxxx.</p> <p>Consent: Your participation in this study is entirely voluntary. You can choose not to answer any question and to withdraw from the study at any time without consequences to your dental care at UBC or elsewhere. You have received all the information you requested about the study and you know who you can contact if you have questions.</p>		
<p>I acknowledge my receipt of a copy of this consent form, and I consent to participate in this study.</p>		
_____	_____	_____
Print Participant's Name	Participant's Signature	Date
_____	_____	_____
Investigator's Name	Investigator's Signature	Date

All the items were coded and scored; however, the interpretation is not available at this data set. NVivo version 12 qualitative software (QSR International Pty Ltd.; Melbourne, Australia) was the computer-assisted qualitative data analysis software (CAQDAS) (NVivo version 12 qualitative software [QSR International Pty Ltd.; Melbourne, Australia]) utilized to analyze the qualitative data, whereas MS Excel (Microsoft Corporation, Redmond, Washington) was used to record the quantitative data.

Other instruments used for data collection were 2 digital HD voice recorders (Sony ICD-UX560 [Sony Co; Tokyo, Japan]), a digital SLR camera with 100 mm lens (Canon EOS Rebel T7i [Canon Inc; Tokyo, Japan]), and an intraoral scanner (TRIOS® [3Shape A/S; Copenhagen, Denmark]).

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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Behavioural Research Ethics Board (BREB) of The University of British Columbia (UBC BREB # H19-00107; 25 June 2019).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Anonymized data is included within this article is available in a public repository (i.e., Mendeley Data) at: <http://dx.doi.org/10.17632/sv8t6tkvjv.1#file-ab78ccec-788c-4913-8daa-3334b8dfcc4d> [19].

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