

Developing Dental Implant Database in Faculty of Dentistry, Khon Kaen University**การพัฒนาระบบฐานข้อมูลรากฟันเทียม คณะทันตแพทยศาสตร์ มหาวิทยาลัยขอนแก่น**

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ABSTRACT

The purpose of this study was to develop a computer software for organizing the data collection of dental implant treatment in the Faculty of Dentistry, Khon Kaen University (KKU). The implant database was established by collecting all implant data including radiographs from dental chart record into the computer software which can be installed at any department in the Faculty of Dentistry, KKU through internet network. Oral examination and radiographic examination on the follow-up day could also be recorded on this software. Therefore, the summarized implant data can be showed in a systematic way and easily to be exported into the Microsoft excel format which is useful for clinicians for evaluate the treatment outcome.

บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เพื่อสร้างและพัฒนาโปรแกรมคอมพิวเตอร์สำหรับเก็บข้อมูลการรักษาด้วยรากฟันเทียมอย่างเป็นระบบเพื่อทำฐานข้อมูลของผู้ป่วยที่ได้รับการบูรณะด้วยรากฟันเทียมที่คณะทันตแพทยศาสตร์ มหาวิทยาลัยขอนแก่น โดยทำการเก็บข้อมูลจากแฟ้มประวัติผู้ป่วย ทั้งตำแหน่งที่บูรณะในขากรรไกร ระบบของรากฟันเทียมที่ใช้ สิ่งบูรณะบนรากฟันเทียม ภาวะแทรกซ้อนหรือปัญหาภายหลังการรักษาที่เคยเกิดขึ้น รวมไปถึงภาพรังสีในทุกขั้นตอนของการรักษา การบันทึกข้อมูลสามารถทำได้ในทุกสถานที่ เนื่องจากโปรแกรมคอมพิวเตอร์ได้ถูกออกแบบให้ข้อมูลเชื่อมโยงกันด้วยเครือข่ายอินเทอร์เน็ต นอกจากนี้การตรวจติดตามผลการรักษาทั้งจากคลินิกและจากภาพรังสีสามารถบันทึกเพิ่มในโปรแกรมคอมพิวเตอร์ได้ในภายหลัง ดังนั้น โปรแกรมคอมพิวเตอร์นี้จะทำให้ข้อมูลการรักษาด้วยรากฟันเทียมถูกเก็บอย่างเป็นระบบ ง่ายต่อการติดตามผลการรักษา อีกทั้งสามารถส่งออกข้อมูลทั้งหมดในรูปแบบฐานข้อมูลเพื่อเป็นประโยชน์ต่อการประเมินผลการรักษาต่อไป

Keywords: Dental implant, Implant database**คำสำคัญ:** รากฟันเทียม ฐานข้อมูล

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Introduction

Currently, the trend of dental implant restorations is increasing because it has several advantages over other options of restorations. Mainly, dental implant can preserve integrity of neighboring teeth, adjacent teeth of dental implant do not require splinted restoration which means no tooth reduction and less risk of dental caries (Misch, 2008). Moreover, it also prevents bone resorption and preserves alveolar bone (Misch, 2008). Most studies found that dental implant replacing single tooth has a high success and survival rate. Goodacre et al. in 2003 reported the success rate of single-tooth implant ranges of 97% (Goodacre, Bernal, Rungcharassaeng, & Kan, 2003). Systematic review found survival rate of single tooth implant is as high as 97% (Creugers, Kreulen, Snoek, & de Kanter, 2000). Despite of the high survival rate of implant-support prosthesis, complications and failures have been documented (Jung et al., 2008). Routine assessment is associated with long term prognosis of dental implant because the earlier the implant is diagnosed, the easier the dentist can manage the complications. Likewise, regular implant maintenance is important to maintain peri-implant tissue (Humphrey, 2006).

The Faculty of Dentistry, Khon Kaen University (KKU) has nowadays provided the dental implant treatment for over decade. Even though, the number of patients that received dental implant treatment is increasing every year, the Faculty of Dentistry, KKU still lacks of the recall system for systematic data gathering. Chart records have been done in different format for each department and the data is not combined. Incomplete data in dental record is also found. Unorganized data collection results in an inability to investigate treatment outcome of implant in the Faculty of Dentistry, KKU as well as inconsistency in the detection of complications.

Data collection using computer software which is firstly established as a useful tool to improve database system for implant patients. Therefore, computer software for implant database in the Faculty of Dentistry, KKU was created. The software which can be installed at any department helps to organize all implant data such as position of implant in dental arch and the details of used implant, date of implant placement and restoration delivery as well as complications. Furthermore, oral examination and radiographic examination on the follow-up day could also recorded on this computer software. All gathering data from clinical and radiographic assessments are summarized into implant database which is convenience to investigate and useful for clinicians to evaluate the treatment outcome of dental implant in the Faculty of Dentistry, Khon Kaen University.

Objectives of the study

To develop a computer software for organizing the data collection of dental implant treatment in the Faculty of Dentistry, Khon Kaen University into dental implant database.

Methodology

Study populations in this study were the crown on implant whose participants undergone implant treatment for a single tooth replacement at Faculty of Dentistry, Khon Kaen University from 2012 to 2016 and completely received a prosthetic reconstruction within 2016.

The implant database was established by collecting all implant data into the computer software which can be installed at any department in the Faculty of Dentistry, Khon Kaen University through internet network. Three parts of

implant data were recorded in this computer software which comprised of demographic data and implant history, follow up visit, and radiographic data.

1. Part of demographic data and implant history

This part of implant database was set up by collecting all implant data from dental chart record.

1.1 Demographic data

These data included name, surname, gender, age, address, mobile number, date of birth, health status, medication, smoking status, abnormal oral habit and history of previous chronic periodontitis.

1.2 Reconstructive procedures before implant placement

These data included reconstructive procedures preparing for implant placement such as ridge preservation, guided bone regeneration, onlay bone graft, ramus block graft, ridge splitting, sinus lift etc.

1.3 Implant details

These data included implant system, implant series, position of implant in dental arch, implant diameter, implant length.

1.4 Implant placement procedure

These data included date of implant placement, staging, reconstructive procedure, surgeon, complication after implant surgery, date of healing abutment placement, complication after healing abutment placement.

1.5 Implant prosthetic procedure

These data included date and type of final impression, abutment type, type of connection, date of abutment and restoration placement, prosthetic type (screw retained or cement retained prosthesis)

1.6 Previous complications

These data included any complications that had been recorded in dental chart recorded such as pain, peri-implantitis, abutment or screw loosening, abutment or screw fracture, decementation of crown, veneering material fracture, food impaction etc.

2. Part of follow up visit

Oral examination on the follow up day could be recorded in this part of implant database.

2.1 Updated general information

These data included health status, medical history, medication and smoking status in a follow up visit.

2.2 Oral hygiene self-care

These data included regular oral hygiene maintenance and additional cleansing equipment.

2.3 Periodontal examination

These data included pain on function, fixture mobility, probing depth at six aspects of each implant, keratinized gingiva at mid-buccal area, gingival bleeding index (Ainamo and Bay, 1975), suppuration, plaque index (Ainamo and Bay, 1975) and interpretation of radiographic bone loss.

2.4 Prosthesis examination

These data included occlusion in centric and eccentric together with technical complications such as abutment screw loosening, veneering material fracture, crown loosening, food impaction due to loss of proximal contact, abutment screw fracture, or implant fixture fracture.

2.5 Health scale for dental implant

These data included success (optimum health), satisfactory survival, compromised survival, and failure which was classified by International Congress of Oral Implantologists, Pisa, Italy, Consensus Conference, 2007.

3. Part of radiographic data

These data included all radiographs from the beginning to complete treatment in JPEG file.

Results

This computer software can be used via internet through the link <https://services.kku.ac.th:8443/dental/site/login>. After log in, the first page of this software displayed the main program on the left side as shown in Figure 1. Patient's profile was created by pressing the "create patient" and data could be filled in application form. List of patients were showed which included patients' DN, name, surname and gender as shown in Figure 2.

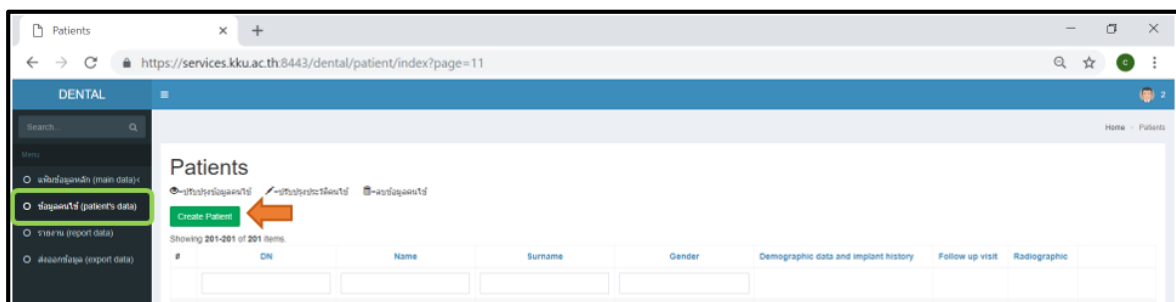


Figure 1 The first page of this software.



Figure 2 List of patients who received implant treatment at Faculty of Dentistry, Khon Kaen University.

Implant data was recorded by clicking on the “eye” button which was available at the end of patient’s row as in Figure 2. After opening each patient’s data, page with three tabs on the top was shown which were three major parts of implant data. Three tabs comprised of demographic data and implant history, follow up visit and radiographic data as shown in Figure 3.

#	Position of implant	Reconstructive procedures before implant placement	Implant system	Implant diameter (mm)	Implant length (mm)	Date of implant placement	Reconstructive procedure	Date of final impression	Date of abutment and restoration placement	Previous complications
No results found.										

Figure 3 This is displayed after opening each patient’s data.

The first tab was demographic data and implant history. Data entry was started with pressing the “create demographic data and implant history”. All details of demographic data and implant history including patient’s demographic data, health status, reconstructive procedures before implant placement, position of implant in dental arch, implant system used, implant diameter, implant length, date of implant placement, reconstructive procedure, date of final impression, date of abutment and restoration delivery, abutment type, prosthesis type and previous complications were recorded. These details in the first tab were summarized and shown in table as in Figure 4.

Demographic data and implant history
Follow up visit
Radiographic Data

DN:12345
Name:ABC
Surname:DEFG
Gender:Male
Mobile:0811111111
age: 48 year 10 month 6 day
← Return To Patient

1st tab

Demographic data and implant history

Position of implant

Create demographic data and implant history

Showing 1-1 of 1 item.

#	Position of implant	Reconstructive procedures before implant placement	Implant system	Implant diameter (mm)	Implant length (mm)	Date of implant placement	Reconstructive procedure	Date of final impression	Date of abutment and restoration delivery	Previous complications
1	36	No	Osstem	5	10	17-10-2556	No	20-02-2556	06-03-2557	yes

Figure 4 Table of summarized demographic data and implant history.

Moreover, further data from examination in follow up visit were recorded in the second tab by entering the tab of follow up visit. Date of follow up, updated demographic data, oral hygiene self-care, history of regular maintenance, additional cleansing instrument, periodontal examination, probing depth, keratinized gingiva, prosthesis examination, occlusal contact, occlusal interference, proximal contact, complications were recorded in this software. The result of examination that beyond normal limit could be notified. After recording all data of both periodontal and prosthesis examination, health scale for dental implant (International Congress of Oral Implantologists, Pisa, Italy, Consensus Conference, 2007) which comprised of success, satisfactory survival, compromised survival and failure were also classified automatically in the computer software. All these data were summarized into table of brief examination from follow up visit as shown in Figure 5.

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Demographic data and implant history **Follow up visit** Radiographic Data

2nd tab →

DN:123456 Name:ABC Surname:DEFG Gender:Male Mobile:0811111111 age: 48 year 11 month 10 day ← Return To Patient

Follow up visit

Position of implant

Search Reset

Create Follow up visit

Showing 1-1 of 1 item.

#	Follow up date	Position of implant	Peri-implant examination	Prosthesis examination	Mesial proximal contact	Distal proximal contact	Treatment	Implant assessment
1	05/11/2561	36	-Peri-implant mucocitis	-light Occlusal contact (centric) -no Occlusal interference (eccentric) -no Abutment or screw loosening -no Decementation of crown -no Food impaction -no Veneering material fracture -no Abutment or screw fracture -no Implant fixture fracture	open contact	tight contact	No	Success (Optimal health)

Figure 5 Table of brief examination details from follow up visit.

The third tab was tab of radiographic data. All radiographs from the beginning to complete treatment were collected by uploading radiograph in JPEG file. All radiographic data were displayed respectively with radiographic date taken and its procedure as shown in Figure 6.

Demographic data and implant history Follow up **Radiographic Data**

3rd tab →

DN:123456 Name:ABC Surname:DEFG Gender:Male Mobile:0811111111 age: 48 year 9 month 18 day ← Return To Patient

Radiographic data

#	Position of implant	X-ray	Date taken	Procedure	
1	36		05-09-2556	presurg	
2	36		17-10-2556	implant placement	
3	36		17-10-2556	implant placement	
4	36		06-01-2557	healing abutment	
5	36		20-02-2556	impression	
6	36		06-03-2557	delivery	
7	36		05-11-2561	follow up	

Figure 6 All radiographs from the beginning to complete treatment.

Summary report such as total number of implant placement, total complications, systems of implant used in each consecutive year, peri-implant status, technical complications and health scale for dental implant were obtained from the software via tab of report data which was available on the left side of every pages.



Figure 7 Subject of implant that could be summarized in this computer software.

Also, the summarized implant data were exported easily into the Microsoft excel to create dental implant database via tab of export data.



Figure 8 The way to export all data into Microsoft excel.

Discussion and Conclusions

Implant data collection using computer software might be available around the world but it was not commercially disseminated and it might not be suitable for each organization. Therefore, the KKU implant database was developed as a tool to improve implant database system at the Faculty of Dentistry, KKU. All implant data from chart record that had been restored in the Faculty of Dentistry, KKU from 2012 to 2016 had been installed. The software was modified and corrected for system improvement and simple for everyone to use. The result of examination that beyond normal limit could be notified. The implant information was convenience to investigate and health scale for dental implant could be classified automatically in the computer software. The summarized implant data was showed in a systematic way and easily to be exported into the Microsoft excel format which was useful for clinicians for evaluate the treatment outcome. Standardized implant recall protocol in Faculty of Dentistry, KKU could be set up.



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