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Survey of orthodontists' attitude and experiences regarding miniscrew implants in Baghdad city

A Graduation project

Submitted to the council of the College of Dentistry, University of Baghdad, in partial fulfillment of the requirements for the degree of Bachelor Dental Surgeon

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بسم الله الرحمن الرحيم

{يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنكُمْ
وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ
وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ}

صدق الله العظيم

سورة المجادلة اية 11

Declaration of the Supervisor

I certify that this graduation project entitled ***"Survey of Orthodontists' Attitude and Experiences Regarding Miniscrew Implants in Baghdad City"*** was prepared by ***"Arwa Sabah Mahdi Alchawoosh"*** under my supervision at the College of Dentistry, University of Baghdad in partial fulfillment of the requirements for the degree of Master of Science in Orthodontics.

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Dedication
To my wonderful Mother,
The Symbol of love and sacrifice.
My dear Father,
The Symbol of faith and support.
My precious and beloved Sisters.
And to my dear friends.

Acknowledgment

First of all, immeasurable thanks and praises to ***"ALLAH"*** for guiding me and giving me the ambition, willingness, and patience to start and complete this work.

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ABSTRACT

In recent times, the need for orthodontic treatment modalities that provide maximal anchorage control but with minimal patient compliance requirements has led to the development of implant-assisted orthodontics and dentofacial orthopedics.

Although miniscrew implants provide absolute anchorage, there is no data to its usage in Baghdad city.

A questionnaire was given to ٧٠ orthodontists working in the Baghdad. The questionnaire consisted of six parts, containing multiple-choice questions. Practice characteristics, treatment planning, practice management, miniscrew placement, miniscrew complications and failures were assessed. All statistical analyses were performed using Excel and taking percentage of each question.

The overall response rate was ٨٥٪. Forty nine of the respondants (٨١٪) reported using miniscrews for orthodontics treatment.

Indirect anchorage for space closure was the most commonly reported treatment indication (٥١٪), followed by Intrusion for anterior open bite (٤٠٪) and Anterior en masse retraction (٣٤٪)

The most commonly reported biological, mechanical, or iatrogenic complications of mini-screw treatment most commonly were screw loosening (٦١٪), followed less commonly by soft-tissue overgrowth/irritation (٦١٪), and irritation caused by auxiliary springs (٤٠٪).

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List of abbreviations

Abbreviations	Explanation
%	Percentage
<	Less than
>	Greater than
°	degree
ANS	Anterior Nasal Spine
CBCT	Cone beam computed tomography
CT	computed tomography
Etc.	et cetera
FEMs	finite element models
gm	Gram
JCO	Journal of Clinical Orthodontics
mm	Millimeter
No	Number
OPG	Orthopantogram
Q	Question
rpm	Rotation per minute
TADs	Temporary Anchorage Devices

Introduction

INTRODUCTION

Graber defined anchorage as 'Nature and degree of resistance to displacement offered by an anatomic unit when used for the purpose of effecting tooth movement' **(Graber, 2005).**

It is based on Newton's third law and is a prerequisite for successful orthodontic treatment of malocclusions. **(Turley *et al*, 1988 and Padadopouluos, 2006)**

Angle realized the limitations of moving teeth against other teeth used for anchorage, introducing ideas such as the use of occipital, stationary and occlusal anchorage **(Angle *et al*., 1929).**

Anchorage conservation in has been an everlasting problem to the orthodontist. Conventional means of supporting anchorage have been used by either intraoral sites or relying on extraoral means. Both of these have their limitation. The extraoral forces cannot be used on 24 x7 basis to resist the continuous tooth moving forces and are also taxing on patients compliance. On the other hand, strict reliance on intra oral areas, usually dental units does not offer any significant advantage, except the fact that patient cooperation is less critical, therefore, it is important to have absolute anchorage to avoid reactive forces which might incur undesirable tooth movements **(Weinstein *et al*., 1963 and Pilon *et al*., 1996).**

Absolute anchorage is defined as no movement of the anchorage units **(Graber, 2005).** Such an anchorage can only be obtained by using ankylosed teeth or dental implants as anchors. However, both these units are dependent on bone to inhibit movement **(Melsen, 1999).**

Ensuring adequate anchorage is often challenging in orthodontics and dentofacial orthopedics **(Vande *et al.*, 2007)**, especially because many of the various methods developed for reinforcing anchorage depend on patient compliance. A major advance in orthodontic treatment in recent years is the introduction of skeletal anchorage with miniscrew implants. Miniscrew implants are now well-established auxiliary anchorage devices and are routinely used in orthodontic practice **(Chen *et al.*, 2008).**

Aims of the Study

1- Assess implant success rates, the predictability of placement techniques, or the management of risk factors for failure among sample of orthodontists in Baghdad.

Chapter One
Review of Literature

Chapter One

Review of Literature

Whenever a force is applied, it produces an equal and opposite reactive force. For tooth movement to occur in the desired direction this reactive force should be equal to or greater than the force applied. The areas or units which provide the resistance to the reactive force thereby preventing undesirable tooth movement arc called anchorage units **(Singh, 2015).**

1.1 Classification of anchorage

Anchorage can be classified

(Singh, 2015)

A. Anchorage classified according to the manner of force application as:

✓Simple.

✓Stationary.

✓Reciprocal.

B. Anchorage classified according to the jaws involved as:

✓Intramaxillary.

✓Intermaxillary.

C. Anchorage classified according to the site where the anchorage units as:

✓Intraoral.

✓Extraoral.

✓Muscular.

D. Anchorage classified according to the number of anchorage units as:

✓Single

✓Compound Reinforced.

E. White and Gardner classified anchorage into six categories as:

✓Simple.

✓Stationary.

- ✓Reciprocal.
- ✓Reinforced.
- ✓Intermaxillary.
- ✓Extraoral.

1.1.1 Intraoral anchorage

This type of anchorage is said to exist when and only when all the anchorage units are present within the oral cavity. Anchorage from all the intraoral sources of anchorage including the teeth, palate, etc. can form part of this type of anchorage. Intraoral anchorage can be further divided into intramaxillary or intermaxillary anchorage depending upon the location of anchorage providing elements between the two jaws (Singh, 2015).

1.1.2 Extraoral anchorage

As the name implies, here the anchorage units are situated outside the oral cavity or extraorally. The extraoral structures most frequently used at the cervical region (as with the use of the cervical pull headgear, the occiput (as with the occipital pull headgear, the forehead and the chin (e.g. the face mask) with the use of extraoral anchorage the anchorage units are situated far away from the actual site where the movement is taking place hence there is hardly any chance of any changes taking place in the anchorage units (Laura, 2013).

The biggest disadvantage of extraoral anchorage is the apparent lack of patient cooperation. The anchorage assembly is bulky' and externally visible making patients conscious of their appearance and affecting the time for which they wear the appliance (Laura, 2013).

Any decrease in the number of hours for which the anchorage assembly is worn affects the quality of results achieved (Laura, 2013).

1.1.3 Muscular anchorage

The perioral musculature is not only very strong but also resilient. The forces generated by the musculature can sometimes be used to bring about tooth movement. The lip bumper appliance may be used to distalize the mandibular first molars or the transpalatal arch when kept away from the palate, may cause the intrusion of the teeth to which it is attached, the maxillary first molars (Singh, 2015).

1.1.4 Implants as anchorage units (absolute anchorage)

Temporary anchorage devices (TADs)—implants/minscrews must have a primary stability and be able to withstand orthodontic force levels. The TADs are called as absolute anchorage without space loss due to movement of anchor teeth (Singh, 2015).

1.2 Miniscrew Implant

"A dental implant is a biomedical device, which is usually composed of an inert metal or metallic alloy, which is placed on or within the osseous tissues." Implants are now being used in orthodontics for the purpose of augmenting anchorage **(Singh, 2015).**

1.2.1 Classification

Based on their origin, skeletal anchorage devices can be classified into two main categories **(Melsen; 2005).**

The first category is osseointegrated dental implants which includes the orthodontic mini-implants, the retromolar implants, and the palatal implants. The second category are the surgical miniimplants as used by Creekmore and Eklund, Kanomi, and Costa et al. The main difference between them is that

surgical mini-implants are small, can be loaded shortly after insertion and have smooth surfaces **(Creekmore *et al*., 1983; kanaomi *et al*.,1997 and Costa *et al*.,1998).**

They can also be classified as either biocompatible or biologic in nature. The biologic group included ankylosed and dilacerated teeth, whereas the biocompatible group included temporary anchorage devices. He further subclassified both groups-based on the manner in which they are attached to bone- into biochemical (osseointegrated) or mechanical **(Cope, 2005).**

Labanauskaite *et al.* (2005) suggested the following classification:

- According to shape and size
  - Conical (cylindrical)- miniscrew implants
    1. Palatal implants
    2. Prosthodontic implants
  - Miniplate implants
  - Disk implants (onplants);
- According to implant bone contact
  a. Osseointegrated
  b. Nonosseointegrated
- According to the application
  a. Orthodontic implants
  b. Prosthodontic implants

1.2.2 Properties of mini-implants

The main differences between the currently available miniscrew implants relate to their composition, size, and design and include **(Jasoria** et al., **2013)**:

(1) The alloy or metal used for their fabrication,

(2) The diameter of threaded portion,

(3) The length of the implant.

(4) The design of the head.

1.2.3 Biocompatibility

All implant systems are made of grade V titanium alloy except `for orthodontic mini-implant which is fabricated from stainless steel **(Jasoria *et al.*, 2013).**

1.2.4 Osseointegration

Because complete osseointegration of screws used in orthodontic applications is a disadvantage that complicates the removal process, most of these devices are manufactured with a smooth surface, thereby minimizing the development of bone ingrowth and promoting soft tissue attachment at ordinary conditions and in the absence of special surface treatment regimens **(Carano *et al.*, 2005; Melsen *et al.*, 2000 and Deguchi *et al.*, 2003).**

1.2.5 Types of Anchorage

The miniscrew implants can provide 2 different types of anchorage: direct and indirect anchorage means that they are connected through bars or wires to the reactive unit, whereas direct anchorage means that they directly receive the reactive forces by acting as an anchor unit **(Jasoria *et al.*, 2013).**

- **Head Design**

The most frequent is the button like design with a sphere or a double sphere like shape or a hexagonal shape. With a hole through the head or neck of the screw, usually 0.8 mm in diameter, this design is mostly used for direct anchorage (Fig. 1.1). Further a bracket like design and a hook like design is also available which can be used both for direct and indirect anchorage. **(Jasoria *et al.* ,2013)**

Figure 1.1 Miniscrew Implant (Jasoria *et al*., 2013).

- **Thread design**

The thread body can be either conical as in miniscrew anchorage system or parallel tapering only at the end as in orthodontic mini-implant. They are available in different lengths but **Costa (2005)** suggested 4 to 6 mm as safe in most regions.

Most miniscrew implants have a thread diameter ranging from 1.2 to 2.0 mm and a length from 4.0 to 12.0 mm **(Kyung *et al.*, 2003 and Maino *et al*., 2005)** although some of them are also available at lengths of 14 or even 21 mm.

1.2.6 Clinical indications for mini-implants

Miniscrews implant Used for **(singh,2015):**

1. Retraction of anterior teeth.
2. Uprighting of molars.
3. Mesiodistal tooth movement.
4. Open bite correction (archived by intruding posterior teeth: skeletal anchorage).
5. Distalization of 1st and 2nd molars.
6. Intrusion of teeth.

7. Compromised anchorage in periodontally involved teeth where anchorage is a problem/congenital anomalies and developmental defects of jaws which may result in inadequate anchorage.
8. Replacement of missing teeth after the completion of orthodontic treatment (should be done only after completion of craniofacial growth).

1.2.7 Contraindications for dental implant placement

Contraindications for using miniscrew implants include problematic healing, compromised immune defense, bleeding disorders, pathological bone quality, or inadequate oral hygiene **(Chen *et al.*, 2007 and Cornelius and Ehrenfeld, 2010)**.

Miniscrew implants may also be contraindicated in children with deciduous or early mixed dentition **(Cornelius and Ehrenfeld, 2010)**.

Heavy smoking detrimentally affects the success rates of orthodontic miniscrews **(Bayat and Bauss, 2010)**.

The contributing role of temporary smoking cessation in the success of dental implants should be considered in the prognosis of orthodontic miniscrew placements but requires further investigation **(Bain, 1996).**

1.2.8 Potential mini-implant complications

A number of risks and side-effects have been observed with mini-implant clinical usage and in the research literature. Fortunately, these are reversible in most clinical situations, but it is important to consider them in an effort to maximize success and to provide informed patient consent **(Richard, 2013).**

- **Mini-implant failure**

• Primary failure occurs when a mini-implant is clinically mobile at the time of insertion. This is due to inadequate cortical bone support in terms of

its thickness and density, or close mini-implant proximity to an adjacent tooth root **(Richard, 2013).**

• Secondary failure refers to a situation where the mini-implant is initially stable but then exhibits mobility, usually after 1–2 months. This delayed instability is due to bone necrosis around the mini implant threads, which may result from thermal bone damage (during pilot drilling), excessive insertion torque, excessively close proximity to a tooth root, traction overload, or a combination of these **(Richard, 2013).**

- **Perforation of nasal and maxillary sinus floors**

There is no evidence that this is problematic in terms of either infection or creation of a fistula. Indeed, the consensus based on dental implant research is that a soft tissue lining forms over a perforating fixture's end. However, in order to maximize bone engagement and minimize patient discomfort it is generally recommended that maxillary alveolar insertion sites should be within 8 mm of the alveolar crest in dentate areas, and closer where maxillary molars are absent **(Richard, 2013).**

- **Damage of hard tissues**

When miniscrews are placed in the alveolar bone, there is a possibility to hurt periodontal tissues. If root damage is included inside of cementum and dentin, a repairing mechanism by periodontal tissues works well, and no serious problem will occur clinically **(Alves *et al.*, 2013).**

Ahmed *et al.* (2012) evaluated the reparative potential of cementum histologically after intentional root contact with a miniscrew. The roots of the premolars were intentionally injured with a miniscrews and extracted at 4, 8, or 12 weeks after the injury. Despite varying depths of the injuries, including involvement of dentin, reparative cementum formation was observed in all

sections. Healing cementum was almost exclusively of the cellular type; 70% of all the teeth exhibited good repair by the end of week 12. Conclusively, this study established that healing of cementum takes place after an injury with a miniscrew, and it is a time-dependent phenomenon. On the other hand, root damage through the dental pulp is irreversible, and root canal filling after pulpectomy or tooth extraction should be necessary.

- **Damage of soft tissues**

When a screw is inserted with an oblique angle to the bone surface, a clinician has to take care not to slip the screw. To prevent the soft tissue damage by the slippage, a self-tapping method, pre-drilling with a round bar on the cortical bone, must be effective. Screws placed through the non-keratinized gingiva or movable gingiva stimulate surrounding soft tissue and sometimes evoke the peri-implantitis **(Kuroda *et al.*, 2014).**

Cheng et al. (2004) reported that miniscrew placement through non-keratinized tissue sometimes caused screw failure. Moreover, the screws are often covered with surrounding movable mucosa and it will become cause of pain and discomfort (Fig. 1.2). Therefore, miniscrews had better be implanted in the range of attached/keratinized gingiva.

Figure 1.2 A screw through non-keratinized oral mucosa. Slight inflammation was shown around the screw head (Kuroda *et al.*, 2014)

The screw head placed close to the muco-gingival junction irritates the movable mucosa and it becomes cause of ulcer. Auxiliaries attached between the screw head and the archwire, i.e. coil springs, elastomeric chains, hooks, and ligation wires, should be adjusted not to touch the gingiva or oral mucosa to avoid the pain and discomfort a patient (Fig. 1.3). A palatal miniscrew sometimes induces pain and injury on the surface of tongue **(Kuroda *et al.*, 2014).**

Use of miniscrews makes it possible to distalize the whole dentition, which breaks the methodological limitation of tooth movement. However; an excessive distal movement causes impaction of the second molar under the gingiva and evokes peri-coronitis, especially in the mandible. Proper diagnosis based on the clinical examinations is important in the implant-anchored orthodontics **(Kuroda *et al.*, 2014).**

Figure 1.3 Gingival inflammation caused by touch of a closing coil spring. The spring has already replaced to a ligature wire (Kuroda et al., 2014).

- **Damage to neurovascular tissues**

Disruption of the inferior dental, mental or greater palatine nerves and blood vessels is highly unlikely given their relative distance from standard insertion sites. The nasopalatine nerve is closer to potential anterior palatal

insertion sites, but this can be readily avoided if recommended mid-palatal insertion procedures are followed, e.g. mid-palatal insertion sites ought to be distal to the transverse level of the maxillary canines **(Richard, 2013).**

- **Mini-implant fracture**

Fracture, especially of the tip section, may occur when a root is inadvertently contacted and/or the insertion angle is altered with the mini-implant partially inserted into the cortical plate. Fractures of the main portion of a mini-implant body, on either insertion or removal, appear to be a particular risk with mini-implants featuring a narrow diameter and cylindrical body design (Fig.1.4), or when excessive insertion torque occurs (e.g. in the posterior mandible with dense, thick cortical bone). In the rare event that removal of a fractured part is indicated then this involves creating access by raising a small mucoperiosteal flap, trephination of a narrow collar of bone around the mini-implant end, and then derotation of the fractured fragment using a weingarts or mosquitos-like instrument **(Chen *et al*., 2006 and Park *et al*., 2006).**

Figure 1.4 Intra-oral radiograph of the retained fractured part of a cylindrically shaped mini-implant situated mesial to the maxillary first molar (Richard, 2013).

- **Pain**

There is often an expectation that high levels of pain will occur, but the opposite is true, such that some patients appear to feel virtually no discomfort during and after insertion **(Lee *et al*., 2008 and Lehnen *et al*., 2011)**.

The majority of patients appear to experience mild pressure-related pain at the time of insertion and up to 24 hours of low level pain thereafter. This is self-limiting, controlled by simple analgesics (e.g. paracetamol or ibuprofen) and comparable (but of shorter duration) to other orthodontic experiences, such as the effects of separators and aligning archwires **(Kuroda *et al*., 2007)**.

The latter comparison is beneficial when it comes to explaining the likely pain experience to patients who already have a fixed appliance in situ. When it comes to mini-implant removal, local anaesthesia is usually not required and indeed patients find that the injection sensation is worse than the actual discomfort of explanation **(Lehnen *et al*., 2011)**.

- **Mini-implant migration**

This depends on the head (and neck) to body ratio, on the degree of bone support, and the relative force level. In effect, both self-tapping and self-drilling mini-implants may tip and/or translate bodily in the direction of the applied force. This is problematic if it causes the mini-implant head to approximate an adjacent bracket or crown and cause soft tissue impingement or difficulty in utilizing the mini-implant head. On balance, the risk–benefit relationship for mini-implants appears to be highly favorable for patients with high or atypical anchorage requirements. This means that the consent process should focus on tangible limitations, such as mini-implant instability and pain, rather than on more theoretical risks of tissue damage **(Alves *et al*., 2011; El-Beialy *et al*., 2009; Liou *et al*.,2004; Liu *et al*., 2011 and Wang *et al*., 2008).**

- **Biomechanical side-effects**

In many respects conventional fixed appliances often only exhibit subtle biomechanical side-effects such as frictional binding, tooth tipping and anchorage loss, because these effects are usually localized to single teeth or a group of several teeth. For example, traction applied at the coronal level (to a bracket) may result in tipping and poorly controlled bodily movement of that tooth. Since the adjunctive use of mini-implants provides more profound anchorage, active in all three dimensions and extrinsic to the fixed appliance, the side-effects may also be more strongly expressed and affect the entire arch (when continuous arch mechanics are utilized). Two clear examples of this occur when oblique traction is applied directly from a mini-implant to retract a canine, using traction applied to the canine bracket on either a flexible or rigid archwire. The oblique vector of traction encourages the canine to tip distally causing either a flexible archwire to exhibit a 'rollercoaster' bowing phenomenon, or a rigid archwire to rotate the entire arch (around its center of rotation) causing a combination of molar intrusion and incisor extrusion **(Richard, 2013).**

Chapter Two
Materials and Methods

Chapter Two

Materials and Methods

2.1 Methods:

Questionnaires were collected from certified orthodontist in private clinic and specialized center of ministry of health. This recollection- and opinion-based questionnaire was divided into six sections: practice characteristics, treatment planning, practice management, miniscrew placement, miniscrew complications and failures.

Blinded, annotated data were extracted for statistical analysis.

2.2 Statistical analyses

All statistical analyses were performed using the database of Excel and making percentage of each answer of all questions.

Chapter Three

Results

Chapter three

Results

3.1 Practice Characteristics

In all, 60 of 70 eligible orthodontists completed the survey, for an 85.7% response rate. Respondents were distributed among Karkh and Rasafa.

Most respondents (58%) had been in practice more than 5 years; only nine have been in practice for less than two years.

3.2 Miniscrew Experience

Forty nine of the doctors (81%) reported using miniscrews for orthodontics treatment.

Experience levels varied widely among the 49 practitioners.

No clinician reported using miniscrews before 2005, and four had begun placing screws as recently as 2016. Sixteen reported having placed more than 20 miniscrews, one reported placing more than 400 miniscrews.

The most common reason cited for not using miniscrews personally was the lack of training (82), other factors included longer chairtime (9%) and cost (9%)

Indirect anchorage for space closure was the most commonly reported treatment indication (51%), followed by Intrusion for anterior open bite (40%) and Anterior en masse retraction (34%).

A panoramic radiograph was the most requested or readily available diagnostic tool used to guide miniscrew placement (69%).

For pain management, most respondents (71%) reported using few drops of LA only; 26% said they used Combination of topical and LA., while 2% administered only a strong topical agent.

The three preferred miniscrew systems were those manufactured by Dentos, Dentaurum, ortho technology and Hubit. While 7 other systems were used by far fewer doctors. The 1.6mm- and 1.4mm- diameter miniscrews were most popular, in lengths of 8mm most commonly.

Most respondents (98%) were satisfied with the performance of miniscrews in their practices. Only one respondent were dissatisfied with it (Table 3.1).

Table 3.1 percentage of results of each question.

Q. NO.	No.	%
Q1-Years in practice		
<2 years.	9	15.00%
2-5 years.	16	26.66%
6-10 years.	14	23.33%
11-20 years.	13	21.66%
>20 years.	8	13.33%
Q2-Location of practice		
Karkh	36	60.00%
Rasafa	25	41.66%
Q3-Active cases in practice		
<100.	22	36.66%

100-300.	19	31.66%
>300	19	31.66%
Q4- Miniscrew implant usage		
Yes	49	81.66%
no	11	18.33%
Q5-reason for not using miniscrew implant		
Cost	1	09.09%
Longer chairtime.	1	09.09%
Need to administer LA.	0	00.00%
Potential need to manage acute pain.	0	00.00%
Lack of training.	9	82.00%
Q6- cases treated with miniscrew implant		
1-5 cases.	8	16.32%
6-10 cases.	10	20.40%
10-20 cases.	15	30.61%
>20 cases.	16	32.65%
Q8-Indication of minscrew implant		
Molar protraction.	11	22.44%
Indirect anchorage for space closure.	25	51.02%
Intrusion of supererupted tooth .	12	24.48%
Intrusion for anterior open bite.	20	40.81%
Anterior en masse retraction.	17	34.69%
Molar uprighting.	7	14.28%
Intrusion for maxillary canine.	4	08.16%
Molar distalization.	14	28.57%

Traction on impacted canine.	13	26.53%
Attachment of protraction facemask.	0	00.00%
Q9- help in guidance of placement of miniscrew implant		
OPG.	34	69.38%
CBCT.	3	06.12%
Periapical.	20	40.81%
None	1	02.04%
Q10-Pain management during placement of miniscrew implant		
Few drops of LA only.	34	71.42%
Combination of topical and LA.	13	26.53%
Only strong topical anesthesia.	1	02.04%
Full nerve block.	0	00.00%
Q11-Miniscrew implant system you use is		
Morelli.	3	06.12%
Dentos.	10	20.40%
Dentaurum.	11	22.44%
Ortho technology.	14	28.57%
Hubit.	12	24.48%
Friadent.	0	00.00%
Others (_____).	7	14.28%
Q12- Diameter of miniscrew implant		
1.4 mm.	13	24.48%
1.6 mm.	36	73.46%
Others.	1	02.04%
Q13- length of miniscrew implant		

6 mm.	7	14.28%
8 mm.	43	87.75%
10 mm.	4	08.16%
Others.	1	02.04%
Q15-Satisfication with the usage of miniscrew implant		
Yes.	48	97.96%
No. (if no, why)	1	02.04%

3.3 Miniscrew Complications

The most commonly reported biological, mechanical, or iatrogenic complications of mini-screw treatment (Table 2.2) were screw loosening (61%), soft-tissue overgrowth/irritation (61%), and irritation caused by auxiliary springs (40%). There were almost no reported cases of tooth ankylosis, sinus perforation, or subcutaneous emphysema.

Table 3.2 Percentages of orthodontists reporting various biological or mechanical complications of miniscrew implants.

Complication of miniscrew implant	Common	Less common	Rare	Never
1- Miniscrew loosening.	61.22%	26.53%	10.20%	02.04%
2- Soft tissue overgrowth/irritation.	12.24%	61.22%	22.44%	04.08%
3- Irritation from auxillary spring.	02.04%	40.81%	34.69%	22.44%

4- Aphthous ulcer.	10.20%	22.44%	38.77%	28.57%
5- Miniscrew drift/migration.	02.04%	36.73%	44.89%	16.32%
6- Interference with tooth movement.	02.04%	12.24%	51.02%	34.69%
7- Tooth sensitivity.	00.00%	14.28%	36.73%	48.97%
8- Infection.	08.16%	12.24%	42.85%	36.73%
9- Miniscrew fracture.	00.00%	08.16%	46.93%	44.89%
10- Slippage into periosteum.	00.00%	04.08%	42.85%	53.06%
11- Root damage.	00.00%	04.08%	32.65%	63.26%
12- Tooth ankylosis.	00.00%	02.04%	16.32%	81.63%
13- Sinus perforation.	00.00%	02.04%	16.32%	81.63%
14- Subcutaneous emphysema.	00.00%	00.00%	14.28%	85.71%

Chapter Four

Discussion

Chapter Four

4.1 Discussion

Results of this study are comparable with one large-scale published survey of orthodontists' experiences with miniscrews **(Hyde *et al*., 2010).**

This study had a higher response rate and potential number of participants, whereas Journal of clinical orthodontics (JCO) e-mailed a secure link to a web-based survey, in this study the questionnaires were distributed to private clinic and specialized center of ministry of health **(Hyde *et al*., 2010).** The proportion of respondents placing miniscrews in our study (81%) was close to that reported in the JCO survey.

This study respondents and the JCO respondents agreed regarding the use of diagnostic tools, anesthesia protocols. A panoramic radiograph was the primary placement guide in both surveys.

The most common miniscrew treatment indications differed slightly among this survey members and the JCO network respondent. Although space closure and intrusion of anterior open bite were the most commonly reported indications in both this survey members and respondents to the JCO survey were more likely to use miniscrews for molar protraction **(Hyde *et al*., 2010)**.

By comparison, the most common indication for miniscrew placement in previous studies has been maxillary molar protraction, followed by space closure and intrusion of supererupted tooth, with other types of treatment in a clear minority **(Hyde *et al*., 2010).**

Two recent systematic reviews have suggested that implant diameters of less than 1.3mm or greater than 2mm, as well as lengths of less than 8mm, are more susceptible to failure **(Chen *et al*., 2009 and Reynders *et al*., 2009).**

In this survey respondents' preferred miniscrew diameters of 1.6mm or 1.4mm and lengths of 8mm agreed with these guidelines.

Assuming that premature screw loosening constitutes a failure rather than a complication, the two complications reported most often by this survey respondant and network orthodontists were soft-tissue overgrowth/irritation and irritation from a spring or attachment. A recent systematic review highlighted the lack of published information on the character and duration of inflammation surrounding miniscrews **(Reynders *et al*., 2009).**

Two studies have found soft-tissue overgrowth and inflammation to be significant risk factors for implant failure **(park *et al*., 2005 and Viwattanatipa *et al*., 2009)**; another noted an increased failure risk with placement in non-keratinized tissue **(Cheng *et al*., 2004).** In a recent survival analysis from Thailand, inflammatory hypertrophy entered the model as a significant risk factor, with the application of orthodontic force, irritation from stainless steel ligatures, and plaque accumulation postulated as etiologic factors **(Viwattanatipa *et al*., 2009).** Combined with the findings of this study, these data suggest that orthodontists need to be aware of the potential for soft-tissue complications and that this area needs further investigation.

Chapter five

Conclusions and Suggestions

Chapter Five

Conclusions and Suggestions

5.1 Conclusions.

1. Most orthodontists in Baghdad uses Miniscrew Implant.
2. Most common uses of miniscrew implant are indirect anchorage for space closure, Intrusion for anterior open bite and anterior en masse retraction.
3. Most common guide that helps in placement of miniscrew implant is OPG.
4. Most common complication for using miniscrew implant are miniscrew loosening, soft-tissue overgrowth/irritation and irritation caused by auxiliary springs.
5. Never occurred complication of miniscrew implant are tooth ankylosis, sinus perforation, or subcutaneous emphysema.

5.2 Suggestions.

1. Expand this survey on all Iraqi cities.
2. Conduct a survey of patient perception with utilizing miniscrew implant.
3. Conduct a clinical trial to assess most common complication of using minscrew implant.
4. Conduct a survey to assess the anchorage loss during retraction comparing using conventional anchorage vs. miniscrew implant.
5. Conduct a survey to assess the use of mini plate as anchorage devices among Iraqi orthodontists.

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APPENDIX

A survey regarding Orthodontists' Attitudes and Experiences of Miniscrew Implants?

Q1-How many years have you practiced orthodontists?
- A- <2 years.
- B- 2-5 years.
- C- 6-10 years.
- D- 11-20 years.
- E- >20 years.

Q2-Where is location of your practice?
- A- Karkh.
- B- Rasafa.

Q3-Active cases in practice?
- A- <100.
- B- 100-300.
- C- >300.

Q4-Do you use miniscrew implant?
- A- Yes. (if yes, go to Q6)
- B- No.

Q5-Reasons for not using miniscrew implant?
- A- Cost
- B- Longer chairtime.
- C- Need to administer LA.
- D- Potential need to manage acute pain.
- E- Lack of training.

(Thank you for answering)

Q6-How many cases you treated with miniscrew implant?
- A- 1-5 cases.
- B- 6-10 cases.
- C- 10-20 cases.
- D- >20 cases.

Q7-The year when you first used miniscrew implant is _____

Q8-3 most common uses in treatment with miniscrew implant?
- A- Molar protraction.
- B- Indirect anchorage for space closure.
- C- Intrusion of supererupted tooth.
- D- Intrusion for anterior open bite.
- E- Anterior en masse retraction.
- F- Molar uprighting.
- G- Intrusion for maxillary canine.
- H- Molar distalization.
- I- Traction on impacted canine.
- J- Attachment of protraction facemask.

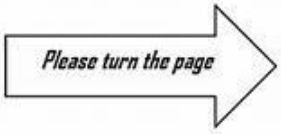
Q9-What do you request from patient to help in guidance of placement of miniscrew implant?
- A- OPG.
- B- CBCT.
- C- Periapical.

Q10-Pain management during placement of miniscrew implant
- A- Few drops of LA only.
- B- Combination of topical and LA.
- C- Only strong topical anesthesia.
- D- Full nerve block.

Q11-Miniscrew implant system you use is
- A- Morelli.
- B- Dentos.
- C- Dentaurum.
- D- Ortho technology.
- E- Hubit.
- F- Friadent.
- G- Others (_____).

Q12-Most common Diameter of miniscrew implant you use is
- A- 1.4 mm.
- B- 1.6 mm.
- C- Others (_____).

Q13- Most common length of miniscrew implant you use is
- A- 6 mm.
- B- 8 mm.
- C- 10 mm.
- D- Others (_____).



Q14-Complication of miniscrew implant:

	Common	Less common	Rare	Never
1- Miniscrew loosening.				
2- Soft tissue overgrowth/irritation.				
3- Irritation from auxillary spring.				
4- Aphthous ulcer.				
5- Miniscrew drift/migration.				
6- Interference with tooth movement.				
7- Tooth sensitivity.				
8- Infection.				
9- Miniscrew fracture.				
10- Slippage into periosteum.				
11- Root damage.				
12- Tooth ankylosis.				
13- Sinus perforation.				
14- Subcutaneous emphysema.				

Q15-Are you satisfied with the usage miniscrew implant?

A- Yes.

B- No. (if no, why)

Thank you for taking your time to complete this questionnaire.
Your assistance in providing this information is much appreciated.