

スポーツ歯科に関するWork Shop 2024（大阪）

グループ6

担当：中禮宏、外川海斗、林海里、吉田結梨子、田邊元、
上野俊明

CQ1：マウスガード等に各種センサを組み込んだデバイスにはどのようなものがあるか？

担当：中禮、外川

検索条件

Pubmed :

[Sensor][mouthpiece] Or [Sensor][mouthguard]

Medical online :

以上の検索エンジン・キーワードで検索し、
過去20年のうち、抄録を読んで該当しそうな論文115報を抽出



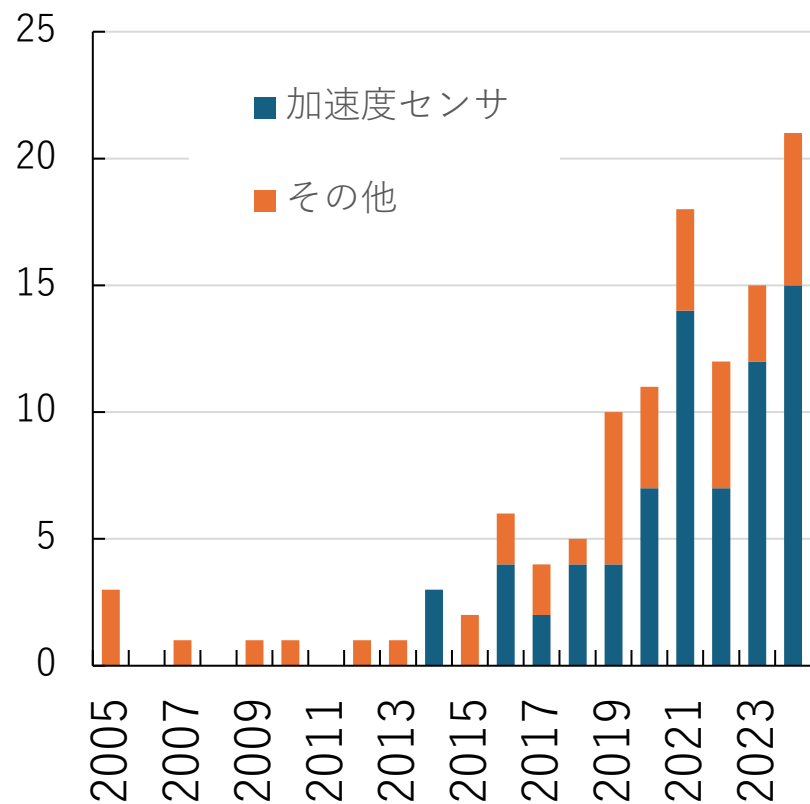
① 加速度・角加速度

② 圧センサ

③ 舌位置・呼吸

④ 唾液成分

に大きく分類可能。



◆ 2020年を境に市販・一般化された加速度・角加速度センサ内蔵ウェアラブルセンサに関する報告が急増している

→頭部外傷（脳震盪）評価用

◆ その他センサは、一部ウェアラブルになっているが、多くはMG内に有線で繋がられている、

→口腔内環境測定用

例) グルコース、唾液成分、咬合圧など

◆ 摂食嚥下機能の評価用

→顎口腔機能評価用

例) 流量・舌位置（舌圧）など

今後の問題点

- 内蔵ウェアラブルセンサ(加速度・角加速度)には、適合調整・咬合調整についての記載がない
 - 今後、調整をしていくことの必要性を広く広める必要性
- 一部の有線ウェアラブルセンサの多くは、市販ウェアラブルセンサの機能を応用のではないかと考えられた

CQ2：スポーツ歯科診療での問診・口腔内診査・検査項目は？

担当：吉田、林、田邊

スポーツ歯科診療での問診・口腔内診査・検査項目は？ IOCの場合

① IOC コンセンサスステートメント (2009)

The IOC Consensus Statement on Periodic Health Evaluation of Elite Athletes (2009)
Athlete PHE Form

PHYSICAL EXAMINATION

Date of Examination: _____

Medical	NORMAL	ABNORMAL (specify)
Appearance		
Eyes/ears/nose/throat		
Hearing		
Lymph nodes		
Heart		
Rhythm		
Heart sounds / murmurs in supine and standing		
Peripheral oedema		
Physical stigmata of Marfan's syndrome		
Blood vessels		
Peripheral pulses		
Delay in femoral pulses		
Vascular bruits (femoral)		
Varicose veins		
Blood Pressure in Sitting Position (after 5 minutes rest)		
Right arm		
Left arm		
Heart rate (after 5 Minutes rest)		
Lungs		
Abdomen		
Genitourinary (males only)		
Skin		
Eyes		
visual acuity (corrected/uncorrected)		
equal pupils		

Dental

DMF Index = Number of decayed, missing or filled teeth : _____

Oral Hygiene assessment: Good Fair Poor

Visible Oral Infection: No Yes

Presence of Worn, Broken or Loose/Mobile teeth: No Yes

Dental appliances (bridge, plate, braces or orthodontic appliance): No Yes

How Can I Care for My Teeth?

Visit Your Dentist

- Go for regular (every 6 to 9 months) dental checkups and cleanings. Treat cavities and other problems when they are small and first identified. Fix any old fractured or leaking fillings when recommended.
- Get X-rays (when necessary) to diagnose cavities, impacted wisdom teeth and other problems not easily seen.
- Replace missing teeth to improve both chewing and appearance.
- In young athletes, identify and treat wisdom teeth problems when found. Studies have shown that athletes with impacted wisdom teeth may be up to four times more likely to suffer a broken jaw while competing.



IOC Medical Commission

SPORTS DENTISTRY



- DMF
- 口腔衛生評価
- 感染所見(視診)
- Wear/破壊的所見/動揺の有無
- 口腔内装置/補綴の有無
- 智歯の評価
- エックス線検査

について言及

スポーツ歯科診療での問診・口腔内診査・検査項目は？ FDIの場合

② FDIガイドライン (2019)

Guidelines for dentists and sports medicine physicians(2019)



◆ SCREEN AND TREAT

Dental screening for athletes should include assessment of teeth (DMFT index and erosion), periodontal condition (PPD, PI, GI index), dental occlusion, TMJ (Temporomandibular joint), saliva, facial muscles, third molars, nutritional habits, inflammation and medical history. Whenever indicated, FDI recommends further investigations, including radiologic examinations (intra-oral x-ray, panorama x-ray, CT scan).

Objective measurements can be used to assess the oral health status of an athlete more accurately and to guide follow-up actions according to the categories below:

	HEALTHY	NEEDS DENTAL TREATMENT	NEEDS EMERGENCY DENTAL TREATMENT
Screen	No pathological and/or functional findings	Presence of at least one pathological or functional finding	Multiple, severe pathological and/or functional findings
Treat	Recommend next check-up in 6 months (elite athletes) or 12 months (amateurs)	Set up a prevention and dental treatment plan, or conduct further dental examination as soon as possible	Set up a prevention plan and provide immediate dental treatment

- DMFT
- Erosion(酸蝕)の評価
- 歯周病検査(PPD,PI,GI)
- 咬合検査
- TMJ検査
- 唾液検査
- 顔面筋評価
- 智歯評価
- 食生活習慣の聴取
- X線検査(デンタル/パノラマ/CT)

について言及あり

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DATE, CITY UNIVERSAL DENTAL EXAMINATION IN SPORTS EXAMINING DENTIST

1. GENERAL INFORMATION (filled by athlete)

FIRST NAME _____ LAST NAME _____ SEX M/F BIRTH DATE ___/___/___ WEIGHT ___ HEIGHT ___
 ADDRESS (street) _____ (number) _____ (city) _____ (PC) _____ (country) _____
 PHONE NUMBER _____ email _____ SPORT _____ YEARS OF EXPERIENCE _____
 CURRENT TEAM _____ COUNTRY _____ DOCTOR _____ DENTIST _____

2. DENTAL HISTORY (filled by athlete)

Last visit to Dentist: 0-6 months ___ 6-12 months ___ >1 year ___ Dental checkups frequency: 1/year ___ 2 or more/year ___ <1 year ___
 Post dental treatments: fillings ___ root canal ___ extraction ___ prosthetics ___ surgery ___ implant ___ periodontal ___
 dentures ___ orthodontic ___ year completed ___
 Allergies/intolerance to medications: yes / no medication: _____
 Have you ever experienced: jaw injury Yes / no specify: _____
 Diet: sodas, lollipops, sports drinks (number per day) ___ Smoking/chew tobacco (times per day) ___ Alcohol drinks per day ___
 MOUTHGUARDS: yes / no type: custom made ___ prefabricated ___ boil & bite ___ occlusal splint: yes / no
 Do you wear one: always sometimes never

How often you had the following problem during the last month?	Very often	Fairly often	Occasionally	Hardly ever	Never
Have you had difficulty chewing any foods because of problems with your teeth, mouth, dentures, or jaws?					
Have you had painful aching in your mouth?					
Have you felt uncomfortable about the appearance of your teeth, mouth, dentures, or jaws?					
Have you felt that there has been less flavor in your food because of problems with your teeth, mouth, dentures, or jaws?					
Have you had difficulty doing your usual jobs because of problems with your mouth, dentures, or jaws?					

3. INITIAL DENTAL EXAMINATION (filled by dentist)

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28	OVERALL SCORE
Negative on Temperature																	
Positive on Percussion																	
Positive on Pressure																	
Demineralization																	
Erosion																	
Abrasion																	
Atrition																	
ICDAS (0 to 6)																	
Eden-Baysal Dental Trauma Index																	
DMFT (Decayed-Missing-Filled Teeth Index)																	

	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38	OVERALL SCORE
Negative on temperature																	
Positive on Percussion																	
Positive on Pressure																	
Demineralization																	
Erosion																	
Abrasion																	
Atrition																	
ICDAS (0 to 6)																	
Eden-Baysal Dental Trauma Index																	
DMFT (Decayed-Missing-Filled Teeth Index)																	

CONFIDENTIAL QUESTIONNAIRE

Dental examination

- ・ カリエスの有無
- ・ 失活歯の有無
- ・ 根尖組織の調査
- ・ DMFTの計算（必須）
- ・ 打診（必須）
- ・ 温度診
- ・ 歯髓診
- ・ International Caries Detection and Assessment System (ICDAS)：う蝕の重症度
- ・ The Eden Baysal Dental Trauma Index：根破折の分類
- ・ 酸食症
- ・ 咬耗
- ・ 摩耗

FIGURE 1 Universal Dental Examination in Sports Protocol, page 1

スポーツ歯科診療での問診・口腔内 診査・検査項目は？ ユニバーサルプロトコル2023年版

Periodontal Screening

- BOP
- PI (Plaque Index)
- GI (Gingival Index)
- 歯肉退縮
- 動揺度
- CAL (Clinical attachment loss)
- PPD (Probing Pocket Depth)
- Saliva screening : pH、刺激時Flow rate
- 小帯の位置
- 粘膜 : plate、lip、tongue、throat/neck、cheeks

Musculoskeletal Screening

- 不正咬合
- TMJ (疼痛、ロック、クリック、クレピタス、圧痛、拘縮)
- 可能ならAngle Class、Occlusal recordsも
- マウスガード使用の有無、種類

For Paralympic Athletes

Conclusion

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4. PERIODONTAL SCREENING (filled by dentist)

		18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28	OVERALL SCORE
BOP (yes/no)																		
PI	Quaine & Moss Plaque Index Score 0 to 3																	
GI	Loe & Silness Gingival Index Score 0 to 3																	
Recession																		
Mobility																		
CAL (mm)																		
PPD (mm)																		
PPD (mm)																		
CAL (mm)																		
Mobility																		
Recession																		
GI																		
PI																		
BOP (yes/no)																		

Oral Cancer Screen

	Normal	Abnormal	Notes
Palate			
Lips			
Tongue			
Throat/neck			

Floor of mouth

	Normal	Abnormal	Notes
Fraenum			
Saliva	pH:		Flow: ml/min
Diagnosis	P	G	Periodontitis (P) / Gingivitis (G)

5. MUSCULOSKELETAL SCREENING (filled by dentist)

Reported pain in the face and/or temples: yes / no, TMJ noise: yes / no, Mandibular movement limitations: yes / no.
 Pain on muscle palpation: yes / no, Pain on TMJ palpation: yes / no
 Functional analysis: Asymmetry: Opening/Closing of the mouth: Deviation (mm):

Limited movement		Locking		Clicking		Crepitus		Compression		Endfeel		Muscles	
mm	Deviation	R	L	R	L	R	L	R	L	R	L	Pain	Tension
Overbite													
Max mouth opening													
Right laterofusion													
Left laterofusion													
Protrusion													
Retrusion													
Palpation/TMJ		Deviation		R		L		20		20			
Pain lateral													
Pain posterior													
Pain intra-oral													
RADIOGRAPHIC EXAM TAKEN (attached as annexed): panoramic: biting: other: OCCLUSAL RECORD TAKEN: yes / no		IHDC: AM: A: ass: adach: nt: yes: mom: ctura: exerc:											

6. PARALYMPIC ATHLETES (filled by dentist)

Disability: Physical: Sensorial: Intellectual: First appearance: (date)
 Causes: Genetic: Congenital: Trauma: Degenerative: Disease: Activity/sport before disability:

Appendage function	Right	Left	Superior		Inferior	
			Normal	Reduced	Absent	Normal

Disease: Medications: Rehabilitation: yes / no

7. SPORTS DENTAL SCREENING PROTOCOL OUTCOME

ATHLETE IS IN GROUP: GREEN YELLOW RED
 (according to the FDI guidelines: Green/no pathological and/or functional findings, Yellow/presence of at least one pathological or functional finding, Red/multiple severe pathological and/or functional findings)

ELIGIBILITY TO PRACTICE SPORTS: YES / NO

CONFIDENTIAL QUESTIONNAIRE

FIGURE 2 Universal Dental Examination in Sports Protocol, page 2.

CQ2-1：スポーツ歯科診療で必要な問診項目は？

検索条件・検索キーワード (抽出数)

Pub med(2015-2024)

“sports dentistry” OR “interview” OR “questionnaire”	23
“sports dentistry” AND (“interview” OR “questionnaire”)	20
“sports mouthguard” AND (“interview” OR “questionnaire”)	2
“sports” AND (“oral checkup” OR “dental checkup”)	1
“sports” AND “dental checkup” OR “oral check”	77
“dental checkup “ OR “questionnaire”	465

Google Scholar(2015-2024)

“sports dentistry” AND (“interview” OR “questionnaire”)	299
“sports” AND (“oral checkup” OR “dental checkup”)	294
“sports” AND “dental checkup”	282
“sports mouthguard” AND (“interview” OR “questionnaire”)	61
“dental checkup “ AND “questionnaire”	1290

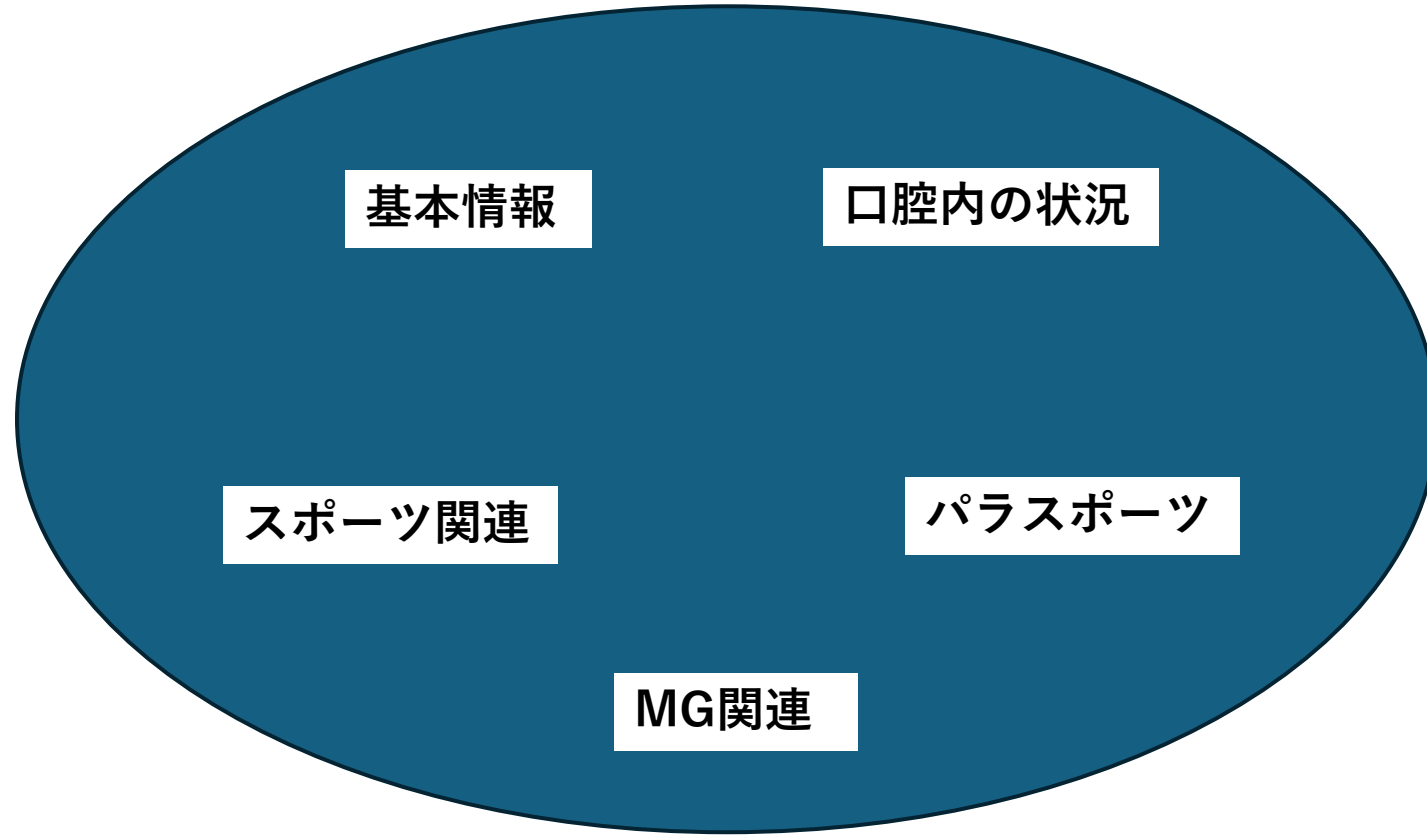
Medical online (2015-2024)

“スポーツ歯科” OR “検診”	32
“歯科” OR “問診”	1721



過去10年に報告された論文やガイドラインを検索し題名や抄録から「スポーツ歯科診療での問診項目」に関する内容が含まれている文献を41報抽出した。

問診項目の分類



「スポーツ歯科診療での問診項目」に関する内容が含まれていた文献41報の中で言及されていた問診項目を上記の5項目に分類した。その上で、今後「スポーツ歯科診療での問診項目」として必要と考えられる項目について検討することとした。

基本情報

年齢・性別：患者の発育段階やライフステージなどを知るうえで重要な情報である。(35/41報)

身長・体重：投薬を行う際の指標となる他、体格指数（BMI）を知るためにも必要となる。(15/41報)

内服薬：患者の基礎疾患を把握するとともにドーピングを未然に防ぐことができる。(8/41報)

(過去の報告例は少ないが今後追加が検討される項目)

アレルギー：診療を行う際に使用する物品（グローブ等）の選択や使用する薬剤，またマウスガード(MG)やフェイスガード(FG)を作製する場合、材料の選択を行う際に必要であると考えられる。(1/41報)

全身的な現病歴・既往歴：

全身の健康状態を考慮した包括的視点で口腔内の診査診断を行うことができ、口腔内疾患に対するリスク評価に用いることができる。(1/41報)

口腔内の状況

口腔内の自覚症状：口腔内を診察する際に事前に把握しておくべき内容である。(27/41報)

顎関節の自覚症状：顎関節症の診断を行う際に把握しておくべき内容である。(25/41報)

食事・飲料：捕食回数や常飲する飲料の種類等を聴取することは口腔衛生指導を行う際の参考となり、口腔内診査時の事前情報としても有用である。(13/41報)

歯科最終受診日・歯科受診頻度・過去の歯科治療歴：

歯科治療計画や口腔衛生指導計画を立案するうえでの参考資料となる。(10/41報)

(過去の報告例は少ないが今後追加が検討される項目)

日常でのブラッシング状況：具体的な口腔衛生指導計画を立案するうえで重要な情報となる。(5/41報)

喫煙習慣：口腔内疾患のリスク評価や口腔衛生指導を行う際に必要な情報となる。(2/41報)

スポーツ関連

競技種目（ポジション）・経験年数・競技レベル・競技中の顎顔面外傷受傷歴：

競技中の顎顔面外傷リスクを評価する際の参考となり、MGやFGの設計を行う際にも必要な情報である。
(31/41報)

MG関連

MG使用経験・（使用経験がある場合）MGの種類・MGの使用頻度：

MGの設計を行う際に重要な情報となる。(29/41報)

（過去の報告例は少ないが今後追加が検討される項目）

競技中の噛みしめの自覚：咬合性外傷や顎関節症のリスク因子となる他、MGの材料選択や設計を行う際に必要な情報となる。(4/41報)

これまで使用していたMGに対する見解：MGを新製する際の参考となる。(1/41報)

(過去の報告例は少ないが今後追加が検討される項目)

パラアスリート

障害の種類・障害の程度・障害を認めた時期・麻痺部位（麻痺がある場合）：

- ・パラアスリートの抱える身体的な問題は多種多様であるため、障害の種類や程度を聴取することで患者毎の問題点を抽出する必要がある。
- ・身体の稼働範囲や四肢、体幹の運動障害等を把握することで、MG着脱の可否やブラッシングの可否など口腔衛生指導を行ううえで必要な情報を得ることができる。

(2/41報)

褥瘡の有無：パラアスリートは車いすで生活する方が多く、臀部等に褥瘡を有するリスクを抱えている。

歯科治療を行う際に患者の身体に負担をかけない為にも褥瘡の部位や状態を把握しておく必要がある。(1/41報)

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CQ2-2 : スポーツ歯科診療で必要な口腔内診査項目は？

検索条件・検索キーワード（抽出数）

PubMed (2009-2024)

- “sports” AND “dental check” (23)
- “sports” AND “caries” (155)
- “sports” AND “erosion” (291)
- “sports” AND (“periodontitis” OR “periodontal disease”) (155)
- “sports” AND “temporomandibular joint” (146)

Medical online (2009-2024)

- “スポーツ歯科” AND “検診” (31)
- “スポーツ歯科” AND “う蝕” (94)
- “スポーツ歯科” AND “酸蝕症” (6)
- “スポーツ歯科” AND “歯周病” (52)
- “スポーツ歯科” AND “顎関節” (43)

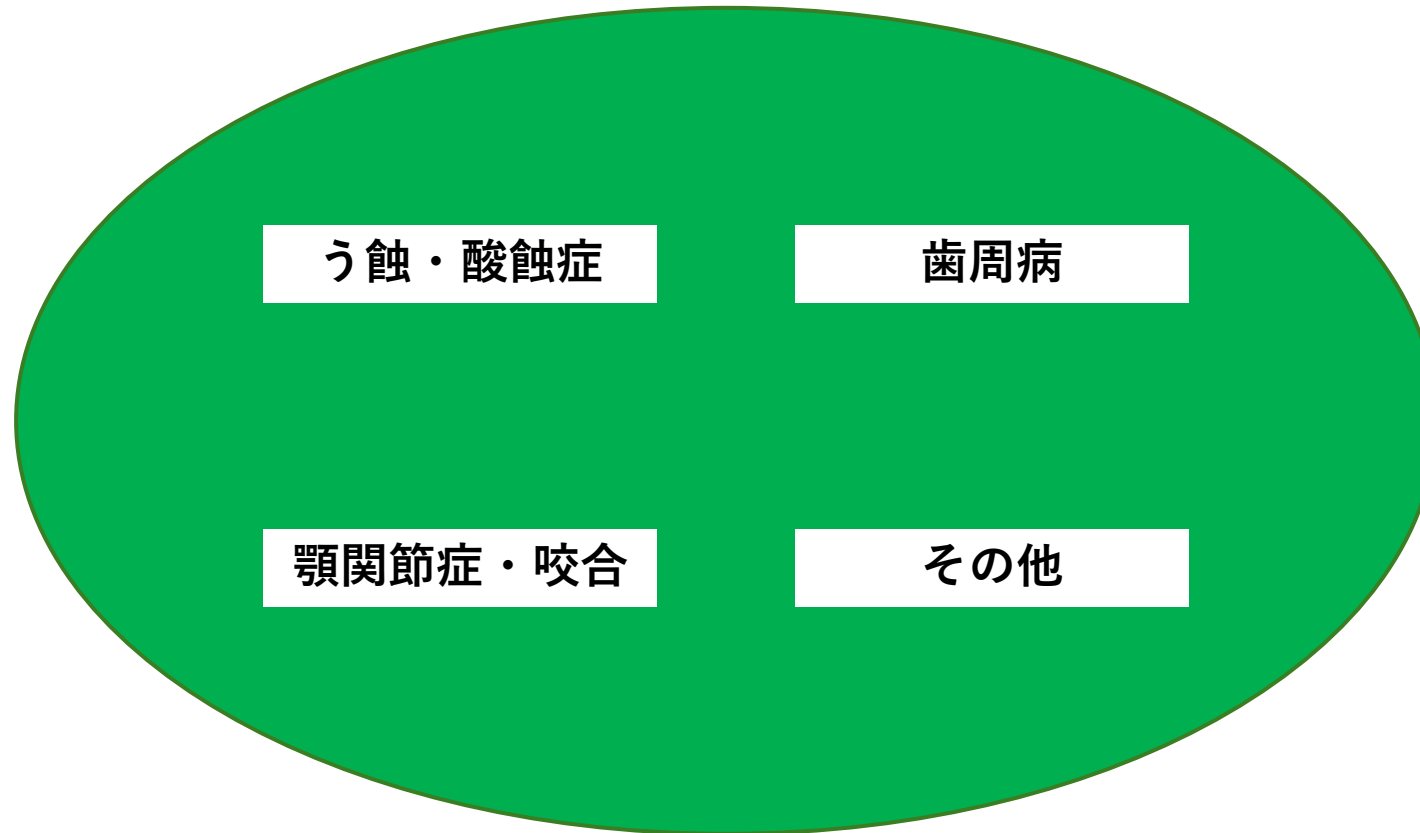
医中誌 (2009-2024)

- “スポーツ歯科” AND “検診” (18)
- “スポーツ歯科” AND “う蝕” (48)
- “スポーツ歯科” AND “酸蝕症” (0)
- “スポーツ歯科” AND “歯周病” (92)
- “スポーツ歯科” AND “顎関節” (64)



過去15年に報告された論文やガイドラインを検索し題名や抄録から「スポーツ歯科診療での口腔内診査項目」に関する内容が含まれている文献を67報抽出。

口腔内診査項目の分類



抽出した文献で言及されていた口腔内診査項目を上記の5項目に分類しそれぞれの項目について検討することとした。

う蝕・酸食症の評価

う蝕の評価（46報検出）

- ・ **DMFT** or **DMFS** (**D**ecayed **M**issing **F**illed **T**eeth (**S**urface))
37報で使用。他研究との比較、という意味でも必須と言える
- ・ **ICDAS** (**I**nternational **C**aries **D**etection and **A**ssessment **S**ystem)
国際齲蝕検出および評価システム。4報で確認。今後増えていく可能性が予想される。
- ・ **う蝕の有無、本数のみの評価**

酸食症の評価（20報）

- ・ **BEWE** (**B**asic **E**rosive **W**ear **E**xamination) を用いた評価
12報で確認。国際誌ではよく見られた
- ・ **酸蝕症の有無、程度や本数を記録**
8報。和文ではこちらが主流

歯周病の評価 (35報)

- ・ **BOP** (**B**leeding **O**n **P**robing) : 10報
- ・ **PI** (**P**laque **I**ndex) : 4報
- ・ **GI** (**G**ingival **I**ndex) : 11報
- ・ **CAL** (**C**linical **A**ttachment **L**oss) : 5報
- ・ **PPD** (**P**robing **P**ocket **D**epth) : 6報
- ・ **BPE** (**B**asic **P**eriodontal **E**xamination) : 7報
- ・ **CPI** (**C**ommunity **P**eriodontal **I**ndex) : 8報
- ・ **PCR** (**P**laque **C**ontrol **R**ecord) : 1報
- ・ **智歯の評価** : 5報



項目は多岐にわたるが、炎症性反応を見る評価が多い傾向

→ 若年層が主となるアスリートの口腔衛生状態の把握

顎関節の評価 (12報)

質問票での評価（スクリーニング）がメイン
（質問票でスクリーニングしてから対象者のみ評価した報告も）

主な診査項目としては

- ・ 関節雑音：5報
- ・ 開口量：2報
- ・ 疼痛：3報

口腔内診査の一環としてでなく、独立して統計を取っている報告も多数あり

咬合の評価 (8報)

- ・ 不正咬合の有無・種類のチェック

その他の評価

唾液の評価

- ・分泌量
- ・分泌速度
- ・pH
- ・緩衝能
- ・S-IgA
- ・Cortisol
- ・細菌検査
- ・ATP

GCF（歯肉溝浸出液）の評価

- ・IL-1、
- ・MMP
- ・ROS

知的障害をもつ人たちの評価

スペシャルオリンピックHealthy Athlete Program（HAP）の
スペシャルスマイルズ（Special Olympics Special Smiles：SOSS）で用いている診査表

知的障害アスリートを対象とするすべての文献で使用

スポーツ歯科診療での口腔内診査項目は？

① う蝕、酸食症の評価

う蝕、酸食症の有無の確認はもちろん、他報告との比較・評価を行うことが出来るという観点から、DMFT（う蝕）、BEWE（酸食症）まで記録しておくことが望ましい。

② 歯周病の評価

統一して使用されている評価項目はないが、炎症性反応を反映するような項目を記録することは、口腔衛生状態の評価の判断に有用

③ 顎関節・咬合の評価

問診や簡易なスクリーニングを主体として記録を採取し、必要に応じて精密な診査へ。

④ その他の評価（必須ではないが予備知識として持っておくと有用）

唾液や歯肉溝浸出液の評価などは、必須項目ではないが多くの情報を得ることが出来るため、オプションの評価項目として行うと有用

知的障害を持つアスリートについてはスペシャルオリンピックで使用している診査表に則って評価する

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CQ2-3 : スポーツ歯科診療で必要な検査項目は？

CQ2-3 スポーツ歯科臨床における必要な検査は？

想定されるケース

スポーツ歯科臨床

想定されるのは

主要ケース

一般歯科症例・検診

修復/エンド/ペリオ/外科/補綴/矯正/予防

外傷症例

歯/歯槽骨/下顎骨/軟組織(下唇)/顎関節

マウスガード

その他対応が求められるケース

気圧性歯痛

摂食障害

口腔顎顔面痛

顎関節症含む

睡眠障害

ケースにあわせて検査を取捨選択していく必要がある。

検索条件・検索キーワード（抽出数）

主要ケースに関連するワード(スポーツ歯科/歯牙外傷/マウスガード)と「検査」について論文検索を行った。

Pub med(2015-2024)

“dental trauma” AND “case report” [pt]	2064
“dental trauma” AND “examination” AND “case report” [pt]	414
“dental trauma” AND “examination” AND “Systematic Review” [pt]	35
“dental trauma” AND “guidelines”	535
“sports dentistry” AND “examination”	30
“sports dentistry” AND “guidelines”	16
(“mouthguard” OR “mouthpiece” OR “mouth protector”)AND “examination”	33
(“mouthguard” OR “mouthpiece” OR “mouth protector”) AND “guidelines”	35
(“mouthguard” OR “mouthpiece” OR “mouth protector”) AND “case report” [pt]	36

Medical online

“歯牙外傷” AND “症例”	23
“歯” AND “外傷” AND “検査” AND “症例”	561

医中誌(2015-2024)

“歯牙外傷” AND “症例”	4
“歯” AND “外傷” AND “検査” AND “症例”	525

上記の検索に加え、IOC、FDI、各種学会のステートメントやガイドラインを参照した。

(1) 一般歯科症例

冷/温痛検査, 打診検査, 圧痛試験, 硬組織視診(脱灰、酸蝕、咬耗), う蝕(ICDAS or DMFT index),
The Eden Baysal Dental Trauma Index
・ 歯周ポケット検査(PPD / CAL), PI / GI, 歯肉退縮, 動揺度, 軟組織視診(Normal / Abnormal),
唾液検査(pH / 唾液流量)
咬合/Angle評価, 顎運動検査, TMD検査(顎関節部 / 骨格筋評価), レントゲン検査, 咬合検査, 口腔内写真

- ・ 上記の検査がリストアップされた。
- ・ 症状の場所、症状の有無、来院目的にあわせて、検査を選択する。
- ・ 検査の感度/特異度を考慮する。

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(2) 歯牙外傷症例

① AAE (米国歯内療法学会)ガイドライン(2013)

American Association of Endodontists.

The Recommended Guidelines of the American Association of Endodontists for The Treatment of Traumatic Dental Injuries

Table 1: Treatment Guidelines for Tooth Fractures and Alveolar Fractures in the Permanent Dentition

	CROWN FRACTURE		CROWN/ROOT FRACTURE	ROOT FRACTURE	ALVEOLAR FRACTURE
	UNCOMPLICATED	COMPLICATED			
DEFINITION AND DIAGNOSIS	Enamel and dentin fracture without pulp exposure.	Enamel and dentin fracture with pulp exposure.	A fracture involving enamel, dentin, and cementum with loss of tooth structure. Crown fracture extends below gingival margin. The pulp may or may not be exposed.	A fracture involving the root structure. It can be localized at the apical, middle or cervical third.	The bone segment containing the involved tooth/teeth is fractured and mobile.
CLINICAL ASSESMENT AND FINDINGS	Sensitivity tests and vitality tests are likely to give positive results. Normal mobility. Percussion test: not tender. If tenderness is observed, evaluate the tooth for possible luxation or root fracture.	Sensitivity tests and vitality tests are likely to give positive results. Exposed pulp sensitive to stimuli. Normal mobility. Percussion test: not tender. If tenderness is observed, evaluate the tooth for possible luxation or root fracture	Sensitivity tests and vitality tests are likely to give positive results. Tender to percussion. Coronal fragment is mobile.	The coronal fragment is usually mobile and sometimes displaced. The apical segment is usually not displaced. Tender to percussion. Sensitivity tests may be initially negative indicating transient pulpal damage.	Fracture lines may be located at any level, from the marginal bone to the root apex. Mobility of the teeth may be segmental if the fracture involves more than one alveolar socket. Occlusal interference is often present due to misalignment of the fractured alveolar segment. Displacement of an alveolar segment.
IMAGING AND RADIOGRAPHIC ASSESSMENT AND FINDINGS	One occlusal and two periapical radiographs from mesial and distal are recommended in order to rule out displacement or the possible presence of a root fracture. Radiograph of lip or cheek lacerations to search for tooth fragments or foreign material.	One occlusal and two periapical radiographs from mesial and distal are recommended in order to rule out displacement or the possible presence of a root fracture. Radiograph of lip or cheek lacerations to search for tooth fragments or foreign material.	One occlusal and two periapical radiographs from mesial and distal are recommended in order to rule out displacement or the possible presence of a root fracture. CBCT should be considered to reveal the extension and direction of the fracture.	One occlusal radiograph to determine the level of the root fracture at the apical and middle third. Two periapical radiographs with varying horizontal angles are needed to locate the fractures in the cervical third of the root. For a root fracture in the middle third, CBCT may rule out or confirm an oblique course of fracture involving the cervical third in the labiolingual dimension.	In addition to the three angulations and occlusal film, additional views such as a panoramic radiograph can be helpful in determining the course and position of the fracture lines. CBCT may be useful for diagnosis of alveolar fractures, especially when they involve the palatal or both cortical plates.

- 温度診(冷/温)
- EPT(電気歯髓診)
- 動揺度検査
- 打診検査
- 歯の位置/変位の検査
- 咬合検査
- デンタルエックス線
- CBCT

について言及あり

(2) 歯牙外傷症例

② IADT (国際外傷歯学会)ガイドライン(2020)

Bourguignon C, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 1. Fractures and luxations. Dent Traumatol. 2020 Aug;36(4):314-330. doi: 10.1111/edt.12578.

Day PF, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 3. Injuries in the primary dentition. Dent Traumatol. 2020 Aug;36(4):343-359. doi: 10.1111/edt.12576. PMID: 32458553.

3 RADIOGRAPHIC EXAMINATION

Several conventional two-dimensional imaging projections and angulations are recommended.^{2, 8, 9} The clinician should evaluate each case and determine which radiographs are required for the specific case involved. A clear justification for taking a radiograph is essential. There needs to be a strong likelihood that a radiograph will provide the information that will positively influence the selection of the treatment provided. Furthermore, initial radiographs are important as they provide a baseline for future comparisons at follow-up examinations. The use of film holders is highly recommended to allow standardization and reproducible radiographs.

Since maxillary central incisors are the most frequently affected teeth, the radiographs listed below are recommended to thoroughly examine the injured area:

1. One parallel periapical radiograph aimed through the midline to show the two maxillary central incisors.
2. One parallel periapical radiograph aimed at the maxillary right lateral incisors (should also show the right canine and central incisor).
3. One parallel periapical radiograph aimed at the maxillary left lateral incisor (should also show the left canine and central incisor).
4. One maxillary occlusal radiograph.
5. At least one parallel periapical radiograph of the lower incisors centered on the two mandibular centrals. However, other radiographs may be indicated if there are obvious injuries of the mandibular teeth (eg, similar periapical radiographs as above for the maxillary teeth, mandibular occlusal radiograph).

Cone beam computerized tomography (CBCT) provides enhanced visualization of TDIs, particularly root fractures, crown/root fractures, and lateral luxations. CBCT helps to determine the location, extent, and direction of a fracture. In these specific injuries, 3D imaging can be useful and should be considered, if available.⁹⁻¹¹ A guiding principle when considering exposing a patient to ionizing radiations (eg, either 2D or 3D radiographs) is whether the image is likely to change the management of the injury.

4 PHOTOGRAPHIC DOCUMENTATION

The use of clinical photographs is strongly recommended for the initial documentation of the injury and for follow-up examinations. Photographic documentation allows monitoring of soft tissue healing, assessment of tooth discoloration, the re-eruption of an intruded tooth, and the development of infra-positioning of an ankylosed tooth. In addition, photographs provide medico-legal documentation that could be used in litigation cases.

5 PULP STATUS EVALUATION: SENSIBILITY AND VITALITY TESTING

5.1 Sensibility tests

Sensibility testing refers to tests (cold test and electric pulp test) used to determine the condition of the pulp. It is important to understand that sensibility testing assesses neural activity and not vascular supply. Thus, this testing might be unreliable due to a transient lack of neural response or undifferentiation of A-delta nerve fibers in young teeth.¹²⁻¹⁴ The temporary loss of sensibility is a frequent finding during post-traumatic pulp healing, especially after luxation injuries.¹⁵ Thus, the lack of a response to pulp sensibility testing is not conclusive for pulp necrosis in traumatized teeth.¹⁶⁻¹⁹ Despite this limitation, pulp sensibility testing should be performed initially and at each follow-up appointment in order to determine if changes occur over time. It is generally accepted that pulp sensibility testing should be done as soon as practical to establish a baseline for future comparison testing and follow up. Initial testing is also a good predictor for the long-term prognosis of the pulp.^{12-15, 20}

5.2 Vitality tests

The use of pulse oximetry, which measures actual blood flow rather than the neural response, has been shown to be a reliable non-invasive and accurate way of confirming the presence of a blood supply (vitality) in the pulp.^{14, 21} The current use of pulse oximetry is limited due to the lack of sensors specifically designed to fit dental dimensions and the lack of power to penetrate through hard dental tissues.

Laser and ultrasound Doppler flowmetry are promising technologies to monitor pulp vitality.

- デンタルエックス線
- CBCT
- 口腔内写真
- 温度診(冷/温)
- EPT
- 動揺度検査
- 変色(視診)
- 圧痛試験
- 歯の位置/変位の検査

について言及

(2) 歯牙外傷症例

③ 外傷後の治療に関するレビュー(2018)

DJ, Djemal S, Malmgren O, Chen YJ, Tsukisboshi M, Andersson L. What are the important outcomes in traumatic dental injuries? An international approach to the development of a core outcome set. Dent Traumatol. 2018 Feb;34(1):4-11. doi: 10.1111/edt.12367.

6つのドメイン



TABLE 2 Core outcome set—generic outcomes

Domains	Generic outcomes
Injury activity	Periodontal healing [to include bone loss, gingival recession, mobility, ankylosis and resorption] Pulpal healing [to include infection]
Physical consequences of disease	Pain Discolouration
Functional status	Tooth loss [to include premature loss for primary teeth]
Social outcomes and quality of life	Quality of Life [to include days off work, school or sport] Aesthetics [patient perception]
Side effects of therapy	Trauma-related dental anxiety
Health resource utilization	Number of clinic visits

外傷後の評価項目

※体系的なガイドラインはない。専門家によるCOSセットのみ。

- ・ 歯周組織検査(骨量、歯肉退縮、動揺度、アンキローシス評価、外部吸収)
- ・ 歯髄検査(温度診)
- ・ 疼痛/変色
- ・ 歯の欠損
- ・ QOL調査(外傷用O-HIP開発?)
- ・ 審美
- ・ 受傷後不安
- ・ 受診回数

について言及

補足Appendix; 歯牙外傷症例(研究フェーズ)

④ペリオテスト

Berthold C, Holst S, Schmitt J, Goellner M, Petschelt A. An evaluation of the Periotest method as a tool for monitoring tooth mobility in dental traumatology. *Dent Traumatol.* 2010 Apr;26(2):120-8. doi: 10.1111/j.1600-9657.2009.00860.x. Epub 2010 Jan 11. PMID: 20070346

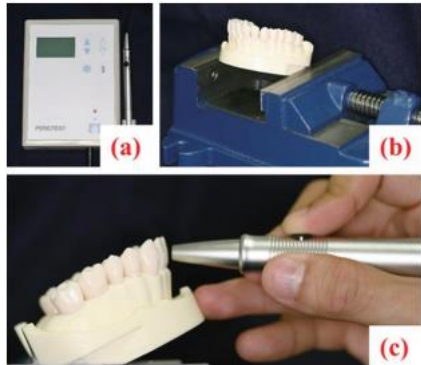


Fig. 4 (a) Tooth mobility assessment using the Periotest Classic (Medizitechnik Gulden). (b) The model was fixed in a vise. (c) The handpiece of the Periotest was held at a right angle (handpiece horizontally, tooth axis vertically) and at a distance of about 1.5 mm between the tip of the handpiece and the tooth.

論文 38 報

研究で活用(スプリント固定評価)。臨床では、インプラント周囲炎ケースでの報告があるが、外傷症例での報告はない。

④レーザードップラー

Lima TFR, Dos Santos SL, da Silva Fidalgo TK, Silva EJNL. Vitality Tests for Pulp Diagnosis of Traumatized Teeth: A Systematic Review. *J Endod.* 2019 May;45(5):490-499. doi: 10.1016/j.joen.2019.01.014. Epub 2019 Mar 14. PMID: 30878165.

Ghouth N, Duggal MS, BaniHani A, Nazzal H. The diagnostic accuracy of laser Doppler flowmetry in assessing pulp blood flow in permanent teeth: A systematic review. *Dent Traumatol.* 2018 Oct;34(5):311-319. doi: 10.1111/edt.12424. Epub 2018 Aug 20. PMID: 29953720.

システマティックレビュー 2 報。臨床検査としての確立はまだ。

(2) 歯牙外傷症例

冷/温痛検査, 歯髄電気診, 打診検査, 圧痛試験, 歯の変色, 歯の位置/変位の検査,
The Eden Baysal Dental Trauma Index
歯周ポケット検査(PPD / CAL), PI / GI, 歯肉退縮, 動揺度, 軟組織視診(Normal / Abnormal)
レントゲン検査(CBCT含む), 咬合検査、QOL調査

- ・ 上記の検査がリストアップされた。
- ・ 複数の学会から検査項目についてガイドラインが発表されており、これに則った検査項目を選択する。

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(3) マウスガード症例

口腔内写真, デンタルエックス線, パノラマ, 動揺度, 歯周ポケット検査, TMD検査
満足度調査(VAS法), 発語明瞭度テスト, ブローイングテスト, 飲水テスト

- ・上記の検査がリストアップされた。
- ・マウスガード作製時の口腔領域の検査項目に関するガイドラインやシステムティックレビューはなく、早急な基準化が求められる。

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補足Appendix; その他のケース

①気圧性歯痛(Barodontalgia)

Robichaud R, McNally ME. Barodontalgia as a differential diagnosis: symptoms and findings. J Can Dent Assoc. 2005 Jan;71(1):39-42. PMID: 15649340.

- ・ 歯の視診
- ・ 打診検査
- ・ Sensitivity(Cold test)
- ・ エックス線検査

ガイドラインなし/レビューあり。

②摂食障害(ED)

Howard JP, Howard LJ, Geraghty J, Leven AJ, Ashley M. Gastrointestinal conditions related to tooth wear. Br Dent J. 2023 Mar;234(6):451-454. doi: 10.1038/s41415-023-5677-0. Epub 2023 Mar 24. PMID: 36964375; PMCID: PMC10038793.

- ・ 歯の視診
- ・ Sensitivity(Cold test)

ガイドラインなし/レビューあり。

補足Appendix; その他のケース

③ 口腔顔面痛

Choi E, Lee YH, Park HK. Orofacial Pain with Cardiac Origin of Coronary Artery Disease: A Case Report and Literature Review. Case Rep Dent. 2023 Jul 12;2023:6304637. doi: 10.1155/2023/6304637. PMID: 37475834; PMCID: PMC10356533.

- MRI
- 口腔内視診

補) 顎関節症について

- AADRガイドライン
- DC/TMD

DC/TMD 診察用紙 (Examination Form) 日付: 年 月 日

患者氏名: 診察科: 診療者: 年 月 日

1. 顔面の痛み、腫れ、目覚め時または起床時に発生するかどうかを調べる

2. 咀嚼時の痛み、腫れ、目覚め時または起床時に発生するかどうかを調べる

3. 開口幅(開口)を測定し、および咀嚼時に発生するかどうかを調べる

4. 顎関節症の診断

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ガイドラインあり/レビューあり。

④ 睡眠障害

睡眠時無呼吸症候群 (SAS) の診療ガイドライン作成委員会編: 睡眠時無呼吸症候群 (SAS) の診療ガイドライン2020.

ガイドラインあり/レビューあり。

補足Appendix; 症例報告における各検査の実施数

論文ケースレポート 13件

スポーツ歯学 学会事後抄録(20) 67件

に記載のあった各検査の実施数をカウントした。

主要ケース

一般症例

- ・視診
- ・EPT(電気歯髄診) (0/1)
- ・動揺度検査 (0/4)
- ・打診検査 (0/0)
- ・歯の位置/変位の検査 (0/0)
- ・咬合検査 (1/4)
- ・デンタルエックス線 (2/5)
- ・パノラマ(0/2)
- ・CBCT (0/2)
- ・歯周組織検査(骨量、歯肉退縮、動揺度、アンキローシス評価、外部吸収) (0/2)
- ・口腔内写真/変色 (1/0)
- ・TMD検査 (0/1)
- ・EPT(電気歯髄診) (0/1)
- ・ブラークインデックス(0/1)

外傷症例

- ・視診
- ・Sensitivity(Cold test) (2/0)
- ・EPT(電気歯髄診) (3/4)
- ・動揺度検査 (2/5)
- ・打診検査 (3/1)
- ・歯の位置/変位の検査 (1/0)
- ・咬合検査 (1/1)
- ・デンタルエックス線 (5/13)
- ・CBCT (3/1)
- ・歯周組織検査(骨量、歯肉退縮、動揺度、アンキローシス評価、外部吸収) (1/1)
- ・口腔内写真/変色 (1/0)
- ・QOL調査(外傷用O-HIP) (1/0)

マウスガード

- ・視診
- ・口腔内写真 (2/0)
- ・デンタルエックス線 (1/5)
- ・パノラマ(1/2)
- ・動揺度 (0/1)
- ・歯周ポケット検査 (0/1)
- ・TMD検査(0/5)
- ・満足度調査(VAS法) (1/0)
- ・発語明瞭度テスト (1/0)
- ・ブローイングテスト(1/0)
- ・飲水テスト (1/0)

その他対応が求められるケース

気圧性歯痛

歯の視診, エックス線検査(2)

摂食障害

歯の視診, デンタル(1), P検査 (1), 咬合検査(1)

口腔顎顔面痛

歯の視診, ベック不安尺度(1), ベックうつ病評価尺度(1), デジタル疼痛計検査(1), 遺伝子解析(1), MRI(1), 聴力検査(1)

睡眠障害

睡眠時PSG(1/1), エプワース眠気尺度(1), 顔貌評価(2), Mallampati分類(1), TMD検査(2), 咬合評価(2), パノラマ(2)