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原文作者姓名：	Al-Baghdai M, Durham J, Steele J
通訊作者學校：	Department of Oral and Maxillofacial Surgery, Department of Restorative Dentistry, School of Dental Sciences, Newcastle University, Newcastle upon Tyne, UK
報告者姓名(組別)：	Intern J 組 黃羿涵
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內文：

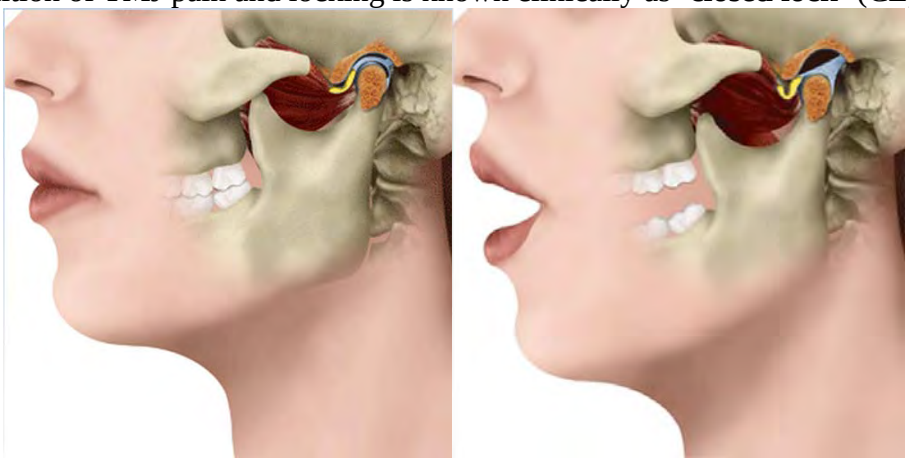
This review paper aims to provide

(i) A narrative review of the pathophysiological need for early intervention in DDwoR and the clinical implications of acute/chronic CL stages on the management pathway.

(ii) A systematic review investigating the effects of locking duration on the success of interventions for CL management.

Introduction

Temporomandibular joint disc displacement without reduction (DDwoR) is a specific subgroup of TMDs where the disc is permanently displaced, most frequently anteriorly or anteromedially, to the condyle resulting in a 'painful locking'. This condition of TMJ pain and locking is known clinically as '**closed lock**' (CL).



Depending on duration of locking, CL can be acute or chronic. The definition of acute and chronic CL stages in relation to locking duration and its implications on 'early' management is, however, controversial. This controversy is related mostly to unproven effect of locking duration on CL treatment outcomes.

Search methods

A systematic search in Medline database via Ovid for TMJ CL studies was conducted (last update was on: 15th August 2013).

Results

The search strategy identified a total of 626 records from electronic and manual searches (426 from MEDLINE and 200 from other sources). Of these, the full texts of 395 potentially eligible papers were retrieved and examined. Eventually, 113 studies (of 122 reports) were found eligible and included in the systematic review.

Pathophysiology and progression of DDwoR

Patients with DDwoR are often characterised by distinct combinations of signs and symptoms: history of clicking followed by sudden onset of pain and limited mouth opening (locking without clicking) and impaired contralateral movement.

The incidence of DDwoR among TMDs is not fully determined but is estimated to occur in about **2–8%**.

The **exact cause of pain** associated with DDwoR is still not fully understood. The **displaced disc** is thought to play an important role in the pain process, but it is unlikely to be the only source of pain as disc displacement alone is not always associated with pain. In addition to alteration in disc position, other factors have been suggested in the development of pain: **joint effusion** and **inflammatory reactions** (e.g. synovitis, capsulitis or retrodiscitis), and **capsule impingement** and/or **retrodiscal tissue compression**.

The other predominant biomedical complaint in DDwoR is **the abrupt restriction in jaw movements**. This is usually attributed to mechanical obstruction by the displaced disc to the translating condylar movement. This condition is often, almost colloquially, termed as 'closed lock' (CL).

The TMJ is a load-bearing joint and its articular tissues have a remarkable adaptive capacity to mechanical loading, but this capacity is not infinite. Sustained **overloading** may increase the susceptibility to degenerative joint disease and other risk factors may adversely influence the adaptive capacity of the articular tissues including age, systemic illness, hormonal, nutritional, traumatic, mechanical and genetic factors.

The risk of degenerative changes in joints with DDwoR was shown to be **four times** greater than in joints with normal disc position.

It is important to treat all patients **early** in the time course of DDwoR to prevent disease progress in susceptible patients. This early management will also prevent progression from an acute to a chronic condition, thereby avoiding the possibility of developing chronic pain and its psychosocial consequences in symptomatic DDwoR patients.

Clinical definition and implications of acute versus chronic CL stages

The term acute is usually related to a temporary state or condition which may or may not be severe, while the term chronic is related to a state or condition that is persistent or long lasting and again does not imply anything about severity. Both medical terms are often used as measures of the **time scale of a disease** rather than its **severity.**

In pain conditions, acute pain usually refers to pain of recent onset with a duration **≤1 month** (≤30 days), while chronic pain usually refers to a persistent pain with a longer duration (**≥3 months** or ≥90 days).

In a CL condition, the terms acute closed lock (ACL) and chronic closed lock (CCL) are widely used in the CL literature usually describing the chronicity of DDwoR. The most reliable **diagnostic criteria** for TMDs depend, however, primarily on the patients' signs and symptoms rather than the duration of symptoms to classify acute versus chronic DDwoR. In clinical trials involving patients with DDwoR, however, most authors usually define their samples based on the **duration of symptoms** (i.e. locking duration or time since DDwoR onset), although there is considerable variation in the threshold that defines acute and chronic stages ranging from 1 to 6 months. In the authors' opinion, a more appropriate clinical classification of acute and chronic CL could be based on the **time scale** for the possibility of recapturing the displaced disc to return the DDwoR to its previous condition (i.e. DDwR) with a non-invasive intervention.

In DDwoR (CL), both patient and management factors have been suggested to predict the outcomes. The predictors suggested include the following: **age**, **gender**, **level of pain**, **range of mandibular motion**, **duration of locking**, **joint**

inflammation, **disc mobility**, **severity of disc displacement**, **stage** and **degree of morphological and pathological changes in disc/condyle complex**, and **type**, **frequency**, and **duration of therapy**. The role of these factors in predicting CL treatment outcome is, however, still **debatable**.

The possible mechanism for jaw locking and DDwoR progression from acute to chronic has been proposed to begin as a displaced disc obstructing the forward condylar translation resulting in restricted mouth opening (acute stage); the repeated attempts to increase mouth opening then displace the disc gradually farther forward to an anterior position, so the condyle can slide forward, and the mouth opening range increases with the time (chronic stage).

From a **clinical perspective**, the progression from an acute to a chronic DDwoR over the time can affect treatment outcome as patients may respond differently to a similar therapeutic intervention dependent on **locking duration**.

Systematic review of effects of interventions in relation to CL duration

Multiple different non-surgical and surgical treatment modalities have been used for CL management. Summary of intervention effects in relation to locking duration:

1. **Mandibular manipulation (MM):**
   - ✧ 19 included studies used different unlock manipulation (UM) techniques on DDwoR patients with a mean locking duration of 9 months (range: 0.03–180 months). The most commonly used UM technique is Farrar's technique, and the most commonly used splint after recapturing the displaced disc is the anterior repositioning splint (ARS). The UM success rate was variable ranging from 9% to 100% (mean: 68%).
   - ✧ Pumping manipulation (PM) was used in 6 studies on DDwoR patients with a mean locking duration of 8 months (range: 0.07–120 months) and had comparable success rate to UM.
2. **Self-management (SM)** and **physiotherapeutic (PT)** interventions:
   - ✧ Self-management involving self-exercises with medication and self-care instructions and education was used on DDwoR patients in 7 studies with a mean success rate of 66%.
   - ✧ Splint therapy: Occlusal splints were used either as a main treatment strategy or as an adjunct treatment to other interventions in the management of DDwoR. In 12 studies, different types of splints were used independently as the sole treatment for DDwoR patients with a mean locking duration of 16 months (range: 0.25–192) with a variable success rate ranging from 13% to 100% (mean: 60%).
3. **Arthrocentesis (AC):**
   - ✧ Arthrocentesis was used in 32 studies on patients with a mean CL duration of 10 months (range: 0.03–109 months) with a success rate ranging from 22% to 100% (mean: 73%).
4. **Arthroscopy (AS):**
   - ✧ Thirty-two included studies used arthroscopy on patients with a mean CL duration of 19 months (range: 0.25–163 months) with a success rate ranging from 50% to 100% (mean: 79%).
5. **Open surgery (OS):**
   - ✧ Open joint surgery was used in 8 studies on CL patients with a mean locking duration of 22 months (range: 0.5–150 months) with a success rate ranging from 70% to 100% (mean: 86%).

Discussion

It is doubtful that a **single** prognostic factor determines successful outcome in CL

management, and it has to be acknowledged that it is likely that several, as yet undefined, factors influence the outcome of CL management including not only the **biomedical factors** but also the **patients' psychosocial phenotype**.

We should avoid invasive interventions in the initial phases of CL management. Following on from this, it makes intuitive sense, therefore, to consider a stepped **timely management** approach to treat patients with symptomatic CL, starting with the simplest, least invasive intervention (e.g. self-management with **early** manipulation) and escalating the treatment only if needed (e.g. rehabilitation by splint and/or physiotherapy) and to defer surgery (e.g. first-line arthrocentesis then arthroscopy) for 6 months or more.

Differences in DDwoR patients' complaints such as the presence/absence of pain or mouth opening limitation may affect the necessity for a specific treatment, but this stepped approach is, in general, the most realistic. The simplest, least costly, quickest, and non-invasive approach that can be easily employed (by general practitioners) with symptomatic DDwoR patients at the first point of contact is the unlock mandibular manipulation that has some initial evidence to support its efficacy in **early** intervention in DDwoR.

In this review, the time after which the UM should not be attempted could not be determined (i.e. time frame for **disc recapturing** possibility). Nevertheless, this treatment modality can aid both diagnosis and treatment and unlikely to have adverse effects. There are, therefore, few significant contraindications to justify postponement of attempting to treat DDwoR through this simple approach.

Conclusion

Clinical staging of DDwoR based on locking duration is one of the few factors that can be easily addressed from patient's history especially in acute closed lock as the patients can usually remember the sudden onset of locking of short duration.

A stepped approach to CL management is indicated, starting with the simplest, cheapest, quickest, and most practical first diagnostic and treatment approach for this condition at the first given opportunity in the patient's healthcare journey. This intervention based on current evidence would seem to be an unlock mandibular manipulation.

題號	題目
1	在磁振攝影的影像中，何者不應該出現在無張口受限(without limited mouth opening)的無復位性顳顎關節盤易位(TMJ disc displacement without reduction)的關節中？ (A) 關節積水 (B) 開口時，關節盤仍停留在髁頭(condyle)前方 (C) 髁頭(condyle)之皮質骨(cortical bone)完整，但厚度不規則 (D) 關節盤後方纖維化，形成假關節盤(pseudo disc)
答案(A)	出處：102 年第一次專門職業及技術人員高等考試牙醫師考試分試考試、藥師、醫事放射師、助產師、物理治療師、職能治療師、呼吸治療師、獸醫師考試--類科名稱：牙醫師（二）- 科目名稱：牙醫學(五)
題號	題目
2	陳小姐最大張口距 32 mm，最大張口時下顎往右側偏移，下列何者為最可能之情況？ (A) 右側關節盤（disc）可復性移位

	(B) 右側關節盤（disc）不可復性移位 (C) 左側關節盤（disc）可復性移位 (D) 左側關節盤（disc）不可復性移位
答案(B)	出處：100 年第二次專門職業及技術人員高等考試牙醫師考試分試考試、藥師、醫事放射師、助產師、物理治療師、職能治療師、呼吸治療師、獸醫師考試--類科名稱：牙醫師（二）- 科目名稱：牙醫學(五)