

Magnification in Paediatric Dentistry

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Introduction

The introduction of magnification into dentistry has followed decades behind the medical surgical fields. Apotheker et al first reported the introduction of a single level magnification microscope into dentistry in 1981. The fields of endodontics and periodontics pioneered the introduction of dental operating microscopes (DOMs) in the late 1980s, reporting the increase in surgical outcomes. Surgical loupes with additional illuminating headlights were introduced to the dental profession as a norm in the 1990s.

The benefits of magnification include:

- Improved visual acuity
- Improved precision of treatment
- Enhanced ergonomics
- Improved patient care

The amount of visual information provided by magnification is the product of horizontal times the vertical number of pixels. Table 1 summarises a comparison of unaided vision to magnification.

MAGNIFICATION	VISUAL INFORMATION
Unaided eye	1 x
2x loupes	4 x
3x loupes	9 x
4x loupes	16 x
5x microscope	25 x
10x microscope	100 x
20x microscope	400 x

Table 1. Comparison of unaided eye and levels of magnification

The unaided eye with 20/20 vision is able to resolve two lines at 0.2mm apart. Magnification of 4x (medium power loupes) allows a resolution of 0.05mm and at 10x magnification (Dental operating microscope DOM), the resolution is closer to 0.01 mm. Magnification beyond 6x allows a clinician to utilise their visual rather than tactile sense for examination, keeping in step with contemporary examination protocols. Medical studies have demonstrated surgeons working with the unaided eye typically make movements of 1-2mm at a time. At magnification levels of 20x (available in DOMs), there is a refinement in movement to 0.01 to 0.02mm allowing significantly increased surgical precision.

The DOM also allows the clinician to sit in an upright neutral and balanced posture, decreasing the onset, degree and symptoms of back-related musculoskeletal problems common in dentistry.

Summary

Magnification by either loupes or a DOM provides benefit for the patient and clinician. The advantages include improved visibility and the potential for improved examination and surgical precision. The ability to sit with an ergonomic posture is a significant advantage to the clinician.

Recommendations

1. Magnification for dental procedures including examination and invasive clinical procedures is recommended. This is in recognition of the benefit to the patient from the potential increased visibility and surgical precision of the operator.
2. Magnification is recommended for the clinician to reduce the potential of back-related musculoskeletal dysfunction that could affect their professional health and well-being.

References

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