INHALED CORTICOSTEROID IMPACT

Evidence Based Dentistry Rounds - **Hygiene & Respiratory Therapy**

Group 10 B3 – 10/21/2020

ROUNDS TEAM

- Group Leader: Dr. Yray
- Specialty Leader: Ms. Nowak
- Project Team Leader: D4 – Nathan Tran
- Project Team Participants: D1 – Max Behrend; D2 – Jacob Zabrowski; D3 – Lane Steinhaus

PATIENT

- 53 y.o. African American Female
- Presents for Comp Exam on 09/09/2019
- CC: **“I want to finally get out of pain and fix my teeth"**

MEDICAL HISTORY

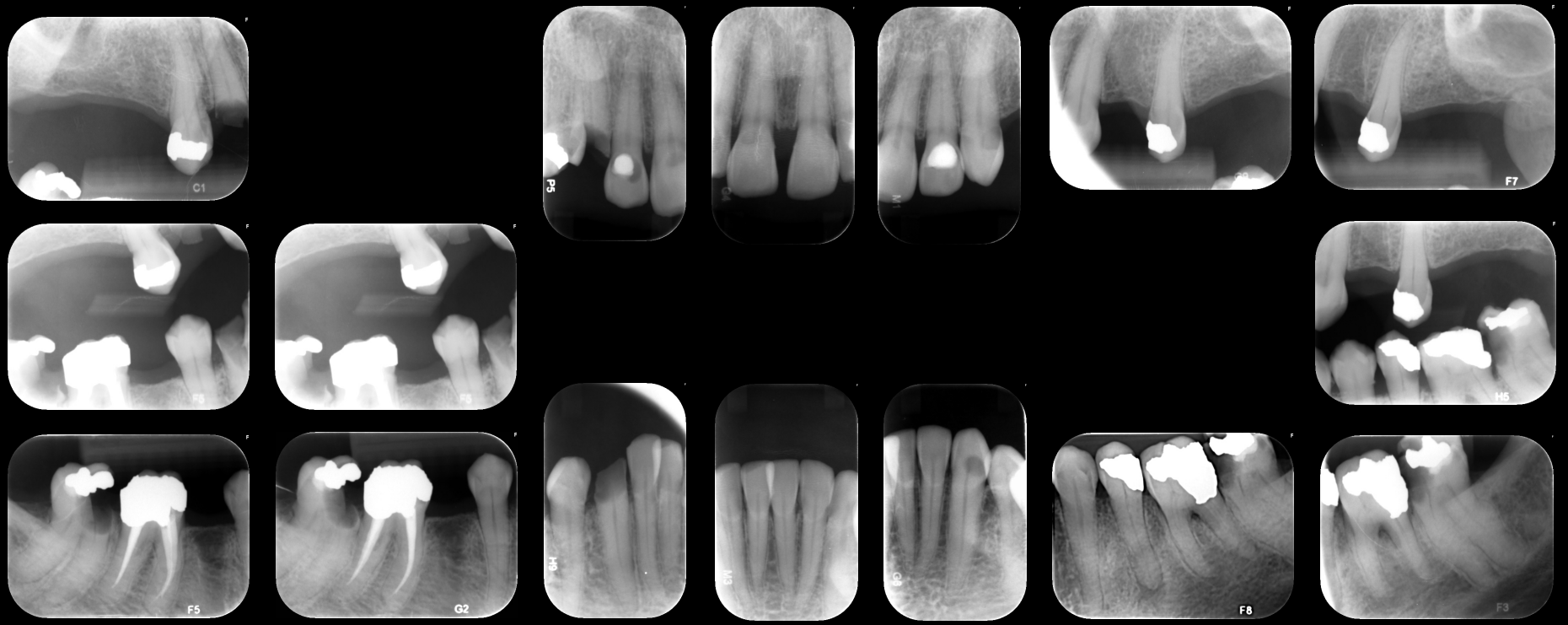
- Asthma
- COPD
- Emphysema
- Type I Diabetes
- Arthritis

MEDICAL HISTORY

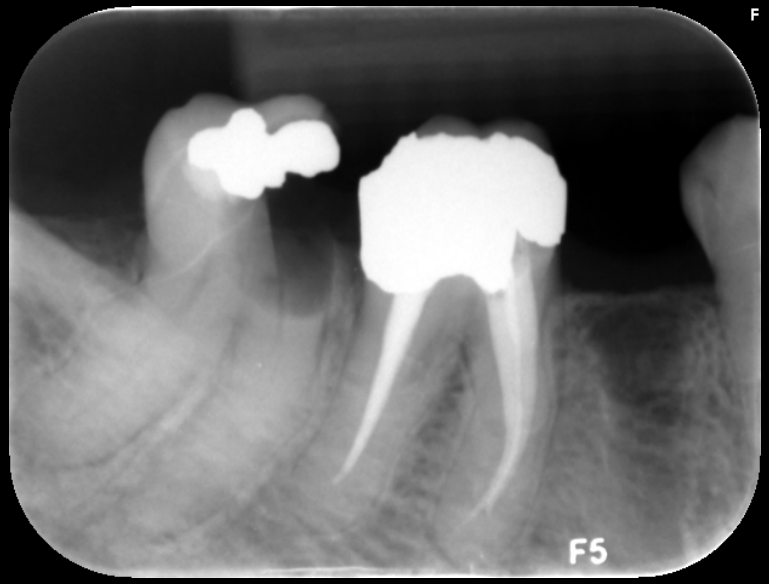
- Medications
  - "I can bring them all next time, but I take something for my sugar, and for my COPD every day"
  - Albuterol
  - Budesonide Formoterol (Symbicort)
  - Insulin

DENTAL HISTORY

- Pt had irregular, emergency-only care
- Came to MUSoD for comprehensive exam in 2016



RADIOGRAPHS



RADIOGRAPHS

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RADIOGRAPHIC FINDINGS

- Significant evidence of decay in all quadrants
- Missing teeth
- Retained root tips at #'s 6 and 7
- PARL at #'s 19 and 20
- Furcation at #19

CLINICAL FINDINGS

- Heavy supragingival plaque deposits
- Gross decay on #'s 13, 18, and 31
- Cervical caries on #'s 22 and 28
- Caries on #'s 5, 7-11, 18-20, and 30

CLINICAL FINDINGS cont.

- Pt reported significant pain on probing
- Profuse BOP

SPECIFIC FINDINGS

- Dry, tacky mucosa
- Pt did not tolerate appointment well

PERIODONTAL CHARTING

PROBLEM LIST

- Primary caries
- Recurrent caries
- Gross decay
- Retained roots
- Periapical radiolucencies

D1 BASIC SCIENCE

What is an inhaler?

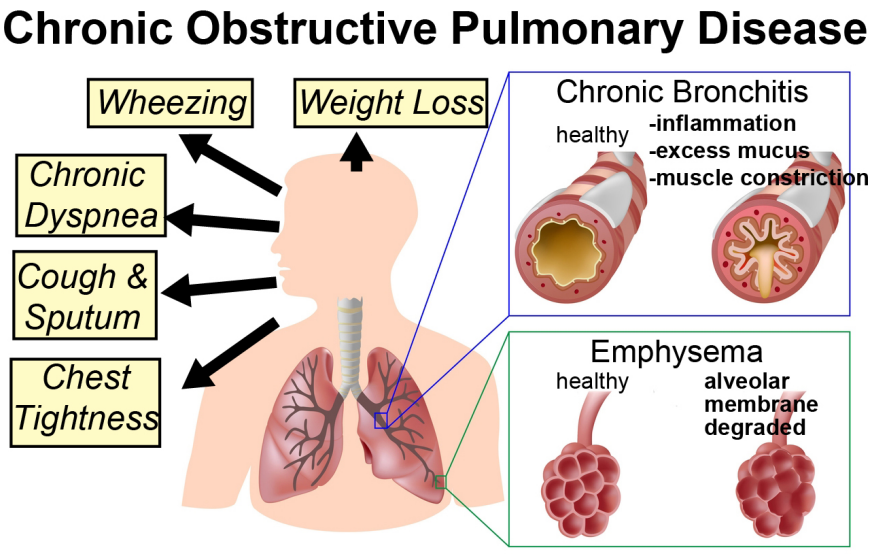
- Mechanism of Delivery
  - An inhaler or pressurized metered-dose inhaler (pMDI) uses a pressurized propellant to deliver a precise dose of medication to a person's respiratory tract.
- Common Medications delivered in this manner
  - Albuterol and Symbicort
- Drug Mechanism of Action
  - Beta-2 agonist at adrenergic receptors (relax bronchial smooth muscle)
  - Symbicort (2 components)
  - Budesonide (synthetic corticosteroid) and formoterol (Beta-2 agonist)

D1 BASIC SCIENCE

An inhaler in use

D2 PATHOLOGY
What is COPD?

- Chronic Obstructive Pulmonary Disease
  - Causes: Smoking, inhalation of pollutants
- Chronic Bronchitis
  - Inflamed bronchial walls
  - Mucus overproduction
  - Obstructs inspiration and expiration
  - Blue Bloaters
- Emphysema
  - Destruction of alveolar walls
  - Larger space, lose elastic recoil
  - Obstructs expiration
  - Pink Puffers

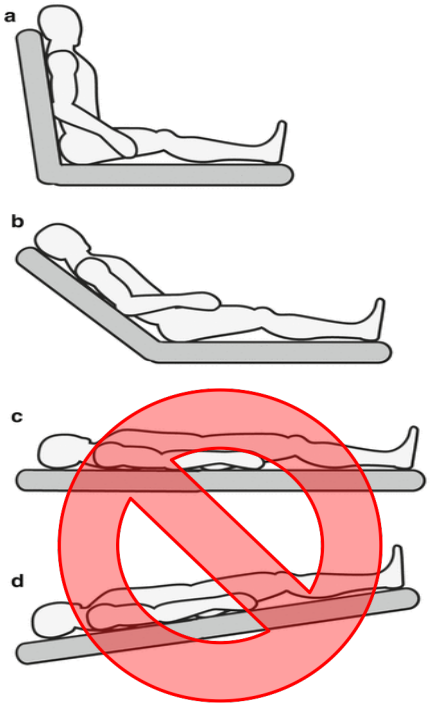


D2 PATHOLOGY

How does COPD affect dental treatment?

- Monitoring
  - Assess current state
  - Short of breath, coughing,
  - O_2 <91% = delay treatment
- Prevention
  - Treat upright or semi-supine
  - O_2 monitoring
  - Humidified O_2 available
- Procedure
  - Avoid bilateral nerve blocks
  - Avoid rubber dams
  - Caution with Nitrous Oxide

- Oral Manifestations
  - Often Smokers
  - Corticosteroid Inhaler



D3 PICO

- **Clinical Question:** Can my patients' regular use of inhaled corticosteroid medications be having an impact on her oral health?

PICO Format

P: Adult patients

I: Inhaled corticosteroid medications

C: No inhaled corticosteroid medications

O: Incidence of caries, xerostomia, and thrush

PICO-FORMATTED QUESTION

- Do adult patients that regularly take inhaled corticosteroid medications exhibit higher rates of oral health issues such as caries, xerostomia, and oral thrush than those that don't?

CLINICAL BOTTOM LINE

- There is evidence that the use of inhaled corticosteroids does increase the perceptibility of a patient to exhibit oral health issues such as caries, xerostomia, and oral thrush.
  - Evidence that alternative medications or treatments may decrease the risk of these side effects
  - Important to keep these side effects in mind when a patient begins taking inhaled corticosteroids, so that we, as dentists, can be proactive in preventing and treating them

SEARCH BACKGROUND

- **Date(s) of Search:** October 13-15 2020
- **Database(s) Used: PubMed**
- **Search Strategy/Keywords:**
  - Corticosteroids
  - Dental Caries
  - Oral Candidiasis
  - Thrush
  - Xerostomia

SEARCH BACKGROUND

- **MESH terms used:**
  - Adrenal Cortex Hormones / adverse effects*
  - Inhalation Administration
  - Candida albicans / drug effects
  - Oral Candidiasis / chemically induced
  - Asthma / drug therapy*
  - Dental caries / chemically induced
  - Xerostomia / chemically induced
  - Salivation / drug effects

Article 1 Citation, Introduction

- Citation:
  - Dekhuijzen PNR, Batsiou M, Bjermer L, Bosnic-Anticevich S, Chrystyn H, Papi A, Rodríguez-Roisin R, Fletcher M, Wood L, Cifra A, Soriano JB, Price DB. Incidence of oral thrush in patients with COPD prescribed inhaled corticosteroids: Effect of drug, dose, and device. Respir Med. 2016 Nov;120:54- 63. d
- Study Design:
  - Individual Cohort Study
- Study Need / Purpose:
  - Determine possible correlation between incidence of oral thrush and ICS use
  - Determine impact of different ICS drug combinations or devices on incidence of oral thrush

Article 1 Synopsis

- Methods
  - COPD patients were grouped by whether they were prescribed FDC ICS/LABA combination therapy or non-ICS therapy at index date
  - Sub-groups were analyzed by drug combinations and devices used
  - Data was examined for incidence of oral thrush during a one-year baseline period and one-year outcome period
- Results
  - Incidence of oral thrush was higher in those prescribed FDC ICS/LABA
  - Significantly fewer patients prescribed BUD/FOR DPI developed oral thrush compared to FP/SAL DPI when allowing differing doses
  - Significantly smaller proportion of patients developed oral thrush in FP/SAL pMDI vs FP/SAL DPI

Article 1 Synopsis

- Conclusions:
  - ICS treatment increases incidence of oral thrush in COPD patients
  - FP/SAL pMDI and BUD/FOR DPI may be more protective against oral thrush
- Limitation:
  - Only two ICS drug combinations were evaluated

Article 1 Selection

- Reason for selection
  - This cohort study compares the incidence of oral thrush in those taking inhaled corticosteroids to those not taking them
  - Also compares oral thrush incidence between two different combination therapies of ICS along with two devices
- Applicability to your patient:
  - Since our patient is currently taking ICS, it is important to know the risks of oral thrush, along with possible drug therapies that may decrease these risks
- Implications
  - Our patient is at a higher risk of developing oral thrush

Level of Evidence: Article 1

- ☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
- ☐ **1b** – Individual RCT
- ☐ **2a** – Systematic Review of Cohort Studies
- ☒ **2b** – Individual Cohort Study
- ☐ **3** – Cross-sectional Studies, Ecologic Studies, "Outcomes" Research
- ☐ **4a** – Systematic Review of Case Control Studies
- ☐ **4b** – Individual Case Control Study
- ☐ **5** – Case Series, Case Reports
- ☐ **6** – Expert Opinion without explicit critical appraisal, Narrative Review
- ☐ **7** – Animal Research
- ☐ **8** – In Vitro Research

Strength of Recommendation Taxonomy (SORT): Article 1

☐	**A** – Consistent, good quality patient oriented evidence
☒	**B** – Inconsistent or limited quality patient oriented evidence
☐	**C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening

Article 2 Citation, Introduction

- Citation:
  - Santos NC, Jamelli S, Costa L, Baracho Filho C, Medeiros D, Rizzo JA, Sarinho E. Assessing caries, dental plaque and salivary flow in asthmatic adolescents using inhaled corticosteroids. Allergol Immunopathol (Madr). 2012 Jul-Aug;40(4):220-4. doi: 10.1016/j.aller.2011.04.005. Epub 2011 Sep 8. PMID: 21862197.
- Study Design:
  - Cross-Sectional Study
- Study Need / Purpose:
  - To assess presence of caries, dental plaque, and salivary flow in adolescents using ICS

Article 2 Synopsis

- Methods:
  - 40 asthmatic (using ICS ≥3 months) and 40 non-asthmatic adolescents were evaluated
  - Dental caries was assessed by number of DMFS and DMFT
  - Non-stimulated salivary flow and visible plaque were measured
- Results:
  - Asthmatic patients presented, on average, 2x DMFT, and DMFS was also higher in comparison to non-asthmatics
  - Asthmatics displayed more visible plaque (statistically significant)
  - No statistically significant difference was found for salivary flow

Article 2 Synopsis

- Conclusion:
  - There is an association between the use of ICS and increased risk of dental caries and bacterial plaque
  - Special attention and preventative treatment should be pursued in these patients
- Limitations:
  - Small sample size
  - Assessing adolescents rather than adults

Article 2 Selection

- Reason for selection:
  - Provides evidence of a link between inhaled corticosteroids and dental caries
- Applicability to your patient:
  - Since our patient is taking ICS, it is important to be aware of the increased risk of dental caries and bacterial plaque
- Implications:
  - Our patient is at an increased risk of developing dental caries and higher amounts of dental plaque

Level of Evidence: Article 2

- ☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
- ☐ **1b** – Individual RCT
- ☐ **2a** – Systematic Review of Cohort Studies
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Strength of Recommendation Taxonomy (SORT): Article 2

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Article 3 Citation, Introduction

- Citation:
  - Hira D, Koshiyama S, Komase Y, Hoshino N, Morita SY, Terada T. Dry mouth as a novel indicator of hoarseness caused by inhalation therapy. J Asthma. 2015 Apr;52(3):296-300. doi: 10.3109/02770903.2014.971965. Epub 2014 Oct 22. PMID: 25272184.
- Study Design:
  - Cross-Sectional Study
- Study Need / Purpose:
  - To assess the predictability dry mouth for hoarseness
  - To assess correlation between ICS use and xerostomia

Article 3 Synopsis

- Methods:
  - Measured non-stimulated volume of saliva in asthmatic and COPD patients
  - Measured relationship between ICS use and salivary secretion
  - Evaluated if hyposalivation and ICS use predicted hoarseness
- Results:
  - Hyposalivation and ICS use were significant predictors of hoarseness
  - Prediction accuracy was higher in patients administered ICS

Article 3 Synopsis

- Conclusion:
  - Hyposalivation is a significant prediction factor of hoarseness induced by corticosteroids
  - Patients with hyposalivation should be considered for alternative inhalation drugs
- Limitations:
  - Primary purpose of study is predictability of hoarseness
  - Only assessed a single ICS: fluticasone

Article 3 selection

- Reason for selection:
  - Provides evidence of a correlation between inhaled corticosteroid use and hyposalivation
- Applicability to your patient:
  - Since our patient is taking ICS, it is important to be aware of this increased risk of hyposalivation
- Implications:
  - Our patient is at an increased risk of developing xerostomia

Level of Evidence: Article 3

- ☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
- ☐ **1b** – Individual RCT
- ☐ **2a** – Systematic Review of Cohort Studies
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Strength of Recommendation Taxonomy (SORT): Article 3

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CONCLUSIONS: D3

How does the evidence apply to this patient?

- Since our patient is currently taking inhaled corticosteroids, it is important to know that research shows that they are at a higher risk of developing oral thrush, dental caries, bacterial plaque, and xerostomia

Based on the above considerations, how will you advise your D4?

- It is important to notify the patient of their increased risks on their oral health, and consider preventative treatment
- Consider these risks when determining best treatment options for this patient

CONCLUSIONS: D4

How can we best **advise our patient?**

- Making sure they know that the medications they take daily can have side effects that negatively impact their oral health is paramount
- Ensure that they are using their inhaler correctly
  - Ask them to demonstrate
  - Elderly? Sick?
  - Spacers and adjuncts

CONCLUSIONS: D4

How can we best **help our patient?**

- Modify OHI accordingly
  - Advise more frequent brushing/rinsing, especially post-inhaler use
- Account for corticosteroid inhaler effects in caries risk when monitoring
- Suggest palliative xerostomia relief products
- Be **mindful** during appointments
  - Some patients have a lot going on – breaks can be important
  - COPD complications – positioning, aerosols, airway

DISCUSSION QUESTIONS

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THANK YOU