Dental Management of the Pregnant Patient

Edited by

Christos A. Skouteris, DMD, PhD

Clinical Assistant Professor
Department of Oral and Maxillofacial Surgery
University of Michigan School of Dentistry
and
Department of Surgery
Section of Oral and Maxillofacial Surgery
University of Michigan School of Medicine
Ann Arbor, MI, USA

WILEY Blackwell

This edition first published 2018

Registered Office
John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, USA

Editorial Office
111 River Street, Hoboken, NJ 07030, USA

For details of our global editorial offices, customer services, and more information about Wiley products visit us at www.wiley.com.

Wiley also publishes its books in a variety of electronic formats and by print-on-demand. Some content that appears in standard print versions of this book may not be available in other formats.

Library of Congress Cataloging-in-Publication Data

Names: Skouteris, Christos A. (Christos Antonios), 1952– editor.
Title: Dental management of the pregnant patient / [edited] by Christos A. Skouteris.
Description: Hoboken, NJ : Wiley, 2018. | Includes bibliographical references and index. |
Identifiers: LCCN 2017052566 (print) | LCCN 2017053212 (ebook) | ISBN 9781119286578 (pdf) |
ISBN 9781119286585 (epub) | ISBN 9781119286592 (oBook) | ISBN 9781119286561 (paperback)
Subjects: | MESH: Dental Care | Pregnancy | Pregnancy Complications
Classification: LCC RG551 (ebook) | LCC RG551 (print) | NLM WU 29 | DDC 618.2–dc23
LC record available at https://lccn.loc.gov/2017052566

Cover Design: Wiley
Cover Image: (Main) © skynesher/Gettyimages; (Top left) Courtesy of Christos A. Skouteris; (Top middle and right) Courtesy of Brent Ward

Set in 10/12pt Warnock by SPi Global, Pondicherry, India

10 9 8 7 6 5 4 3 2 1

Dedications

In loving memory of my parents Antonios C. Skouteris, MD (1915–2008), Obstetrician-Gynecologist, and Maria A. Skouteris, CRN, (1918–1997), Chief Maternity Nurse.

To my family Kiki, Konstantinos, Eleni, Milou, Jolie, Perry, and Regina for their unconditional love and support.

To my mentor, George C. Sotereanos, DMD, MS, Oral and Maxillofacial Surgeon, a man of few words but with a wealth of experience and wisdom.

Contents

Preface

Pregnancy is a unique and momentous experience in a woman's life. As such, a comprehensive approach to the management of oral health problems that a woman may face during gestation becomes a necessity. My interest in embarking on the preparation of this book has three sources. First, the influence from my family environment. Both my parents were healthcare practitioners who worked in the area of obstetrics and gynecology throughout their professional lives. At an early age, I recall often listening with interest to long discussions on their experiences with pregnant patients. I started to realize the challenges that they had to face and I came to appreciate how deeply they cared about both the mother and the newborn child. In later years, as a dental student, I used to assist in the delivery room and in gynecologic surgical procedures and witnessed the miracle of childbirth. Although I had already made my career choice, I developed an interest in the care of the pregnant patient as a result of my early exposure to the intricacies of gestation. This interest was further augmented when I provided secretarial assistance to my father during his writing of two textbooks, one on menstruation and the other, a two-volume textbook on obstetrics and gynecology. Through my involvement in these projects, I learned a lot about the complexity of maternal physiology, the pathological conditions of pregnancy, and the potential risks that may complicate labor and delivery. It is only unfortunate that my father never had the opportunity to see his work published.

Then came the opportunity to provide surgical services to pregnant women during my academic and professional career as an oral and maxillofacial surgeon. Caring for pregnant women is an inimitable experience because in reality care is provided to two individuals, the mother and fetus. Even simple interventions may play an important role in achieving a successful outcome during dental treatment of an expectant woman and may prevent future implications on the quality of life of both mother and newborn. The well-being of both has to be the primary concern of the health provider.

Refreshing and updating my knowledge of the surgical management of the pregnant patient was dictated by the fact that proper care must be provided while assuring the safety of the mother and unborn child. Through my interaction with pregnant patients, I recognized that the management of their health issues needed to be urgent and decisive, often requiring a very thorough multidisciplinary intervention by a team of experienced professionals.

Finally, my pursuit of knowledge in the management of the pregnant patient showed that a more broad and systematic view on the treatment of maternal oral health issues was required. There are noble efforts in the literature to address the subject of oral health maintenance during pregnancy, but an in-depth approach is needed in view of recently published research data and advances in treatment modalities in many of the disciplines of medicine and dentistry that

have a direct bearing upon the management of maternal morbidity. Moreover, there is insufficient discussion in the dental literature on the medical, obstetric, and gynecologic emergencies or familiarization of the oral health professional with the appropriate response in such circumstances. The importance of discussing with other specialists, in a holistic approach, the systemic and oral health problems during pregnancy is amply emphasized in this book, since the complexity of the pregnant state and maternal health management provide the perfect grounds for developing interprofessional collaboration. An interprofessional approach to the pregnant patient's needs leads to decisions that safeguard the safety and quality of life of the patient and fetus, while always considering and respecting patient autonomy. The decisions that are made can have a far-reaching impact on the immediate family and social environment of the pregnant patient.

The book also addresses the all-important issue of preparing for unexpected events. Many nonphysician public safety groups (paramedics, firefighters, police) have training in the handling of a prehospital event such as maternal cardiac arrest, impeding labor, and even on-scene delivery. There is practically no mention of such an event and its management in the dental literature related to care of the pregnant patient. Cardiac arrest during pregnancy and prehospital (on-scene) delivery in the dental office can be a potentially real situation and should be given its due attention. All these topics are discussed in the book and are supported by time-honored, recent, and current literature resources, quick-reference tables, and illustrations.

The book's intended readership includes dental and dental hygiene students, general dentists, dental hygienists, dental faculty, oral and maxillofacial surgeons, and specialized dentists in other disciplines of dentistry. This book could also be a useful reference source for physicians in the practice of general and family medicine.

I am indebted to the chapter contributors for embracing this project with warmth and enthusiasm and for offering their valuable input in the fields of their interest and expertise.

September 2017

Christos A. Skouteris, DMD, PhD
Ann Arbor, Michigan

Acknowledgments

The editor wishes to acknowledge Mr Niles N. Mayrand, BBA, CMP, Manager, Clinical Simulation Center, Department of Learning Health Sciences, University of Michigan School of Medicine, for his assistance in the preparation of the simulated spontaneous vaginal delivery; Dr Andrew Beech, Oral and Maxillofacial Surgical Resident, for compiling the clinical information on the trauma cases; and Dr Kyriaki Marti for offering her artistic talent in the making of Figures 8.2 (a) and (b), 9.1, 9.2, and 9.3.

I would also like to thank my editor from Wiley, Mrs Jayadivya Saiprasad, with whom I had the pleasure to interact in preparation of this book, for keeping me on the right track with her astute comments and valuable suggestions.

List of Contributors

Benjamin Craig Cornwall, DDS, FICD
Assistant Professor, Hospital Dentistry
Director of General Practice Residency
University of Michigan
Ann Arbor, MI, USA

Sean P. Edwards, DDS, MD, FACS, FRCD[C]
Chalmers J. Lyons Endowed Clinical Professor of Oral and Maxillofacial Surgery
Associate Professor and Residency Program Director
Department of Surgery
Section of Oral and Maxillofacial Surgery
Chief, Pediatric Oral and Maxillofacial Surgery
University of Michigan School of Medicine
Ann Arbor, MI, USA

Igor Makovey, DDS, MD
Chief Resident
Department of Surgery
Section of Oral and Maxillofacial Surgery
University of Michigan School of Medicine
Ann Arbor, MI, USA

Kyriaki C. Marti, DMD, MD, MHPE, PhD, FEBOMS
Clinical Assistant Professor
Department of Oral and Maxillofacial Surgery
Department of Periodontics and Oral Medicine
Department of Cariology, Restorative Sciences and Endodontics
University of Michigan School of Dentistry
Ann Arbor, MI, USA

James Murphy BDS, MB, BCh, FFD
Attending Oral and Maxillofacial Surgeon
John H. Stroger Jr Hospital of Cook County
Chicago, IL, USA

Brent B. Ward, DDS, MD, FACS
Associate Professor and Chair
Department of Oral and Maxillofacial Surgery
University of Michigan School of Dentistry
Section Head, Oral and Maxillofacial Surgery/Hospital Dentistry
Department of Surgery, and Fellowship Program Director
Oral/Head and Neck Oncology and Microvascular Reconstructive Surgery
University of Michigan School of Medicine
Ann Arbor, MI, USA

1

Ethical Issues in the Treatment of the Pregnant Patient

Christos A. Skouteris

Ethical principles and the rights of the mother and fetus for the provision of proper medical and dental care are closely intertwined. These principles are based on the fact that care is actually provided to two individuals. Since the mother is the life support of the fetus, the medical and dental status of the mother should be optimized during pregnancy. Therefore, necessary medical and dental treatment should not be denied to any female patient because of pregnancy.

Dental procedures, however minor, are associated with increased patient anxiety levels, the need for imaging, and the administration of medications. For these reasons, elective dental procedures should be postponed until postpartum. However, when a pregnant patient is in need of emergency, preventive, or restorative treatment, the aforementioned reasons may force the dentist to refuse treatment because of concern for the mother and the unborn child and the fear of liability and litigation if something happens to the pregnancy and the fetus. Denial of treatment, however, raises serious ethical issues. Thomas Raimann (2016), in response to the question whether it is ethical for dentists to refuse seeing pregnant women until after they give birth, laid out the ethical principles of the ADA Code of Ethics that particularly apply in the dental management of the pregnant patient (Box 1.1).

The principle of patient **Autonomy** (self-governance) **and Involvement** states that "The dentist should inform the patient of the proposed treatment in a manner that allows the patient to become involved in treatment decisions." Patient involvement in treatment decisions is highly desirable and ethical; however, pregnant women who have medical needs during pregnancy should not be expected to weigh the risks and benefits when they have to decide whether to proceed with a proposed treatment whose impact on the fetus is unknown. This is an impossible demand; no one can weigh unknown risks and benefits. On the other hand, a straight denial of treatment by the dentist without patient involvement becomes a unilateral decision and thus ethically questionable.

The principle of **Nonmaleficence** (do no harm) expresses the concept that professionals have a duty to protect the patient from harm. Under this principle, the dentist's primary obligations include keeping knowledge and skills current. Denying treatment to a pregnant patient violates this principle in the sense that it is evidence of lack of knowledge on the dentist's part. Evidence-based studies have shown that necessary dental procedures can be performed during the second trimester of pregnancy without an increased risk for serious medical adverse events, spontaneous abortions, preterm deliveries, and fetal malformations. The conservative approach of discouraging treatment because of lack of knowledge about the effects of a procedure and/or medication is not typically erring on

Dental Management of the Pregnant Patient, First Edition. Edited by Christos A. Skouteris.

Box 1.1 Ethics in the dental management of the pregnant patient.

Applicable principles of the ADA Code of Ethics
- Principle I: Autonomy, Involvement
- Principle II: Nonmaleficence
- Principle IV: Justice
- Principle V: Veracity

the side of fetal safety; rather, it suggests a lack of knowledge about whether it is riskier for the fetus to be exposed to a medication or to the effects of untreated maternal morbidity. According to Lyerly *et al.* (2008), in the absence of information about the safety and efficacy of medications, pregnant women and their healthcare providers are left with two unsavory options: take a drug, with unknown safety and efficacy, or fail to treat the condition, thus leaving the woman and fetus vulnerable to the consequences of the underlying medical problems.

Under the principle of **Justice** ("fairness"), a "dentist has a duty to treat people fairly." Moreover, "the dentist's primary obligations include dealing with people justly and delivering dental care without prejudice" and "dentists shall not refuse to accept patients into their practice or deny dental service to patients because of the patient's sex." Refusing to treat a pregnant patient could be interpreted as discriminating against her unjustly and thus disregarding the ADA Code.

The **Veracity** principle ("truthfulness") refers to the dentist's primary obligations which include respecting the position of trust inherent in the dentist–patient relationship, communicating truthfully and without deception, and maintaining intellectual integrity. The dentist is not truthful if denying treatment to a pregnant patient on the grounds of potential harm to the mother and fetus, when scientific evidence does not support that the pregnancy and the fetus are at risk.

The most serious ethical issues arise in cases of life-threatening conditions, such as head and neck infections, severe maxillofacial trauma, and locally aggressive benign and malignant tumors. These conditions will be discussed later in the book. Under those circumstances, treatment decisions for a pregnant patient necessitate a choice between saving her life and that of the fetus, or other dramatic trade-offs. In such cases, Puls *et al.* (1997) stated that there is general consensus (especially in the wake of the Angela Carder case; Box 1.2) that the primary consideration

Box 1.2 The Angela Carder case.

Angela Carder (née Stoner) was diagnosed with Ewing's sarcoma at the age of 13 years. Her prognosis was dismal but following chemotherapy and radiation, she managed to survive and remained in remission for several years. She got married and with her doctors' approval she became pregnant.

In 1987, in her first week of the third trimester of pregnancy, she was found to have recurrence of her disease with lung metastases. She had already fought hard to survive and she requested to be treated again with chemotherapy and radiation which had contributed to her years in remission, in spite of the risks to the fetus. She was admitted to George Washington University Hospital, in Washington DC, where she was deemed a terminal case. As a result of her condition, there was disagreement as to whether she should be treated, exercising her right to save or prolong her life, at the expense of the life of the fetus. Although her condition deteriorated and she was running out of time, Angela did not elect to have an emergent C-section.

This caused concern among the hospital risk managers who, fearing a lawsuit from pro-life organizations, requested a court hearing on the issue, providing legal representation for

Angela, the fetus, and the hospital. At the hearing, her family and her attending physicians all testified against performing a C-section, based on low survivability for the patient and her expressed desire not to go through with the procedure. Angela was not able to testify during the hearing because of her very poor physical condition. The testimony that tipped the balance in favor of an emergent C-section was that of a neonatologist, not familiar with her condition, who testified that the fetal survival rate was 60%. Interestingly, the same fetal survival rate applies also to pregnant women in good health who are at the same gestational age. Angela's attending oncologist was not asked to testify, although he had expressed the view that the procedure was inadvisable for the patient and the fetus.

The court eventually issued an order for an emergent C-section to be performed, although Angela strenuously objected to it. Only one of the hospital's obstetricians reluctantly agreed to perform the procedure without an informed consent and against the will of the patient. Following the C-section, the fetus is purported to have survived for 2 hours. Angela endured the procedure, was informed about the fate of the fetus, and died 2 days later.

Eventually, in April of 1990 after a legal battle, the US Appellate Court ruled that all previous decisions be annulled and that Angela Carder had the right to make her own decisions relative to her health and the health of her fetus. It was the first Appellate Court decision to take a stand against forced C-sections. The case stands as a landmark in United States case law establishing the rights of pregnant women to determine their own healthcare.

Adapted from Thornton and Paltrow (1991).

should be saving the life of the mother. Charles Weijer (1998) points out, however, that in some cases a pregnant patient's decision to refuse treatment and sacrifice herself for her child should be counted as an autonomous decision worth respecting, and that it should not be assumed that only self-interest decisions can be autonomous.

References

Lyerly AD, Little MO, and Faden RR. (2008) A critique of the fetus as patient. *American Journal of Bioethics*, **8**, 42.

Puls L, Terry R, and Hunter J. (1997) Primary vaginal cancer in pregnancy: difficulty in the ethical management. *Ethics and Medicine*, **13**, 56.

Raimann T. (2016) The ethics of dental treatment during pregnancy. *Journal of the American Dental Association*, **147**, 689.

Thornton TE and Paltrow L (1991) The rights of pregnant patients. Carder case brings bold policy initiatives. *HealthSpan*, **8**(5), 10–16.

Weijer C. (1998) Commentary: self-interest is not the sole legitimate basis for making decisions. *British Medical Journal*, **316**, 850.

Further Reading

Flyn TR and Susarla SM. (2007) Oral and maxillofacial surgery for the pregnant patient. *Oral and Maxillofacial Surgical Clinics of North America*, **19**, 207.

Zalta EN, Nodelman U, Allen C, *et al.* (2011) Pregnancy, birth, and medicine. Stanford Encyclopedia of Philosophy. Available online at: https://plato.stanford.edu/entries/ethics-pregnancy/ (accessed 15 October 2017).

2

Physiologic Changes and Their Sequelae in Pregnancy

Christos A. Skouteris

The physiologic changes that occur during pregnancy are hormonal as well as anatomic, consequently affecting many organs and systems of the female body. These changes can occasionally present as subtle homeostatic alterations that can progress to serious, even life-threatening situations, if they are not recognized early and preventive and management actions are not employed in a timely manner. Pregnancy induces cardiovascular, respiratory, hematologic, urinary, gastrointestinal, hepatobiliary, endocrine, immunologic, dermatologic, musculoskeletal, and psychologic changes that are more dramatic in multifetal than in single pregnancies. Most of these changes return to normal after delivery.

Cardiovascular

The cardiovascular system's response to pregnancy is a dynamic process aiming at providing uteroplacental circulation for normal fetal growth and development. Changes in cardiovascular physiology involve the peripheral vascular resistance, cardiac output, heart rate, stroke volume, and blood pressure (Box 2.1).

Peripheral vascular resistance decreases by approximately 35–40% as a result of systemic vasodilation. Vasodilation is mostly the result of the action of increased concentrations of relaxin, progesterone, and estradiol. Relaxin is a peptide hormone produced by the corpus luteum of the ovary, the breast and, during pregnancy, also by the placenta, chorion, and decidua. This hormone has been shown to have an endothelium-dependent vasodilatory role in pregnancy that can influence small arterial vessel resistance, thus causing an increase in arterial compliance. Nitric oxide was also thought to contribute to the decrease in peripheral vascular resistance through vasodilation, as studies of human hand flow suggested, but studies of forearm flow showed that it does not. The decrease in peripheral resistance starts in the first trimester, is more profound in the second trimester, with a slight upswing during the third trimester of pregnancy.

Cardiac output increases sharply in the first trimester, continues to increase into the second trimester and by the 24th week of gestation has reached a level of 30–50% above the baseline. There is no consensus as to whether any changes in cardiac output occur in the third trimester of pregnancy. The increase in cardiac output in early pregnancy is credited to increased stroke volume whereas the increase in cardiac output in late pregnancy is attributed to the increase in heart rate. Cardiac output falls to nonpregnant values in a few weeks after delivery. The physiologic increase in cardiac output is a compensatory mechanism to counteract the decreased oxygen capacity of maternal blood. Any event from any source that can cause a drop in cardiac output may result in maternal hypoxia and compromise the condition of the fetus.

Dental Management of the Pregnant Patient, First Edition. Edited by Christos A. Skouteris.

Box 2.1 Most significant cardiovascular changes in pregnancy.

- Peripheral vascular resistance decreases
- Cardiac output increases
- Heart rate increases
- Stroke volume increases
- Blood pressure decreases

Heart rate shows a progressive increase by 10–20 bpm during the first and second trimester with a peak in the third trimester. The overall increase in heart rate raises 10–20% above the baseline and remains increased for 2–5 days after delivery.

Stroke volume starts increasing from the eighth week and reaches a peak by the 20th week of pregnancy. It drops back to baseline by the second week post partum. Stroke volume is augmented by the increase in end-diastolic volume and maintenance of ejection fraction through a possible increase in contractile force. The increase is the result of dramatic heart and vascular remodeling during the first few weeks of pregnancy. Heart remodeling is expressed throughout pregnancy by a left ventricular wall thickness and left ventricular wall mass increase by 28% and 52% above pre-pregnancy values respectively, and by a 40% increase in right ventricular mass. Vascular remodeling is demonstrated by an increase in arterial compliance. A measure of increase in arterial compliance is provided by the aortic augmentation index, a marker of aortic stiffness, which decreases significantly early during pregnancy, reaching a lowest point in the second trimester and gradually increasing in the third trimester.

Blood pressure is decreased during pregnancy, including systolic blood pressure, diastolic blood pressure, mean arterial pressure, and central systolic blood pressure. Diastolic blood pressure and mean arterial pressure decrease more than systolic blood pressure. Arterial pressures decrease to a lowest point during the second trimester (dropping 5–10 mmHg below baseline), but the majority of the decrease occurs early in pregnancy (6–8-week gestational age) compared with nonpregnancy values. This decrease in blood pressure during pregnancy is ascribed to vasodilation mainly caused by relaxin, progesterone, estradiol, prostacyclin, and potentially by nitric oxide.

Respiratory

Respiratory changes affect the condition of the upper airway tissues as much as the pulmonary and respiratory physiology (Boxes 2.2, 2.3). The upper airway undergoes significant mucosal changes. The mucosa becomes friable and edematous. Capillary engorgement causes hyperemia of the nasal and oropharyngeal mucosa and larynx which begins early in the first trimester and increases progressively throughout pregnancy.

Box 2.2 Respiratory changes in pregnancy: mucosal/anatomic.

- Upper airway mucosa friable, edematous
- Thoracic cage expands
- Ribs flare
- Diaphragm elevated
- Intrathoracic pressure increases

Box 2.3 Respiratory changes in pregnancy: Pulmonary/respiratory.

- Respiratory rate unchanged
- Tidal volume increased
- Minute ventilation increased
- Total lung volume decreases
- Vital capacity unchanged
- Residual volume decreased
- Inspiratory reserve volume unchanged
- Expiratory reserve volume decreased
- Forced expiratory volume 1 and ratio to forced vital capacity unchanged
- Maternal/fetal O_2 consumption increased
- Functional residual capacity decreased
- Hyperventilation
- Compensatory respiratory alkalosis
- Dyspnea

Respiratory changes in pregnancy: glossary of terms.

- **Tidal volume** (TV): amount of air moving into lungs with each inspiration
- **Inspiratory reserve volume** (IRV): air inspired with maximal inspiratory effort in excess of tidal volume
- **Expiratory reserve volume** (ERV): volume expelled by active expiratory effort after passive expiration
- **Residual volume** (RV): air left in lungs after maximal expiratory effort
- **Vital capacity (VC)**: greater amount of air that can be expired after maximal inspiratory effort
- **Forced vital capacity** (FVC): the amount of air which can be forcibly exhaled after taking the deepest breath possible
- **Minute ventilation** (MV): the total lung ventilation per minute
- **Functional residual capacity** (FRC): volume of air present in the lungs at the end of passive expiration
- **Forced expiratory volume 1** (FEV1): the maximum amount of air expired in 1 second
- **FEV1/FVC ratio**: the proportion of vital capacity that can be expired in the first second of forced expiration

Up to one-third of pregnant women experience severe rhinitis, which predisposes them to frequent episodes of epistaxis and upper respiratory tract infections. Polyposis of nose and sinuses may occur and regress after delivery. Airway conductance increases, indicating dilation of the respiratory tract below the larynx. This is mainly due to direct effects of progesterone, cortisone, and relaxin. Another potential mechanism is through enhanced beta-adrenergic activity induced by progesterone.

Anatomic and respiratory compensatory changes are commensurate with the increased oxygen demands of the mother and fetus and are mediated by biochemical and mechanical factors. These changes accommodate the progressive increase in oxygen consumption and the physical impact of the enlarging uterus. Normal oxygen consumption is 250 mL/min at rest and increases by 20% over the nonpregnant state in order to meet the 15% increase in the maternal metabolic rate.

As part of the anatomic adaptations to address these demands, the configuration of the thoracic cage changes early in pregnancy. The shape of the chest changes as diameters increase, by about 2 cm, resulting in a 5–7 cm expansion of the chest circumference. The flaring of the lower ribs causes the diaphragm to rise by up to 4 cm, its contribution to the respiratory effort increasing with no evidence of being impeded by the uterus. These changes are thought to be mediated by the effect of progesterone, which together with relaxin increases ribcage elasticity by relaxing ligaments. Flaring of the ribs results in an increase in the subcostal angle, transverse diameter, and chest circumference. As gestation advances, upward displacement of the diaphragm causes a total lung volume decrease of 5%.

In general, what remains unchanged in the respiratory physiology of the pregnant patient is the respiratory rate, vital capacity (VC), inspiratory reserve volume (IRV), FEV1 or the ratio of FEV1 to forced vital capacity, and the arterial pH.

Gas exchange undergoes significant changes during pregnancy. Tidal volume (TV) and minute ventilation increase by 30–40%. Minute ventilation is increased (primarily an increase in tidal volume with a normal respiratory rate) for two reasons. First, oxygen consumption and carbon dioxide production increase 20–30% by the third trimester and up to 100% during labor, necessitating increased minute ventilation to maintain normal acid–base status. In addition, progesterone directly stimulates the central respiratory center, causing a further

Benign Diseases and Conditions

Christos A. Skouteris

Benign diseases that impact the general population can also affect pregnant women. In addition to dental caries and periodontal disease, benign conditions which require treatment and are pregnancy related include pemphigoid gestationis and the epulis of pregnancy. Certain lesions (e.g., central giant cell granuloma) have been reported as showing an exacerbation during pregnancy, whereas other conditions such as temporomandibular disorders (TMD) show a considerably lower prevalence in pregnant women than nonpregnant women, despite the relationship that TMD and hormones seem to have.

Pregnancy-Related Benign Conditions

Pemphigoid gestationis (PG) is an autoimmune pregnancy-associated subepidermal blistering disease. It usually affects the skin and, rarely, mucous membranes. In the oral cavity, it presents with multiple painful erosions. In rare cases, the oral lesions are prodromal findings before skin lesions develop. Etiologically, the autoimmune response of pregnant patients with predominantly oral mucosal lesions demonstrated the presence of circulating IgA but not IgG autoantibodies, targeting epitopes within the C-terminal portion of the BP180 ectodomain. The lesions of PG cause considerable discomfort during eating and swallowing. Nutritional impairment should be avoided during pregnancy and therefore proper treatment should be instituted. Mild cases can be managed with oral antihistamines or topical corticosteroids. In severe cases with or without generalized skin involvement, treatment consists of administration of steroids (initially prednisolone 50 mg/day), resulting in rapid clearance of both oral and cutaneous lesions that heal without scarring. The corticosteroid dosage is gradually reduced to 25 mg/day to prevent severe exacerbations. The corticosteroids could then be tapered to progressively lower doses and discontinued.

Epulis of pregnancy is a localized, soft, hyperplastic lesion which develops on the gingiva of pregnant women with an estimated incidence of 0.2–5% (Figure 6.1). The epulis is usually pedunculated but can also be broad-based. In its early stages, it is highly vascular with a tendency to bleed spontaneously or when traumatized. The bleeding might be quite excessive not only due to its vascularity but also to a thin overlying epithelium. It may develop at any time during pregnancy but appears to be most common during the second trimester. The lesion usually measures up to 2 cm in diameter but can occasionally grow to a considerable size. Any gingival site can be the location of the epulis but it is mostly found in the interdental papillary labial gingiva of the anterior maxillary teeth. Teeth adjacent to the epulis may become increasingly mobile, although bone around the teeth directly involved by the lesion is very rarely affected.

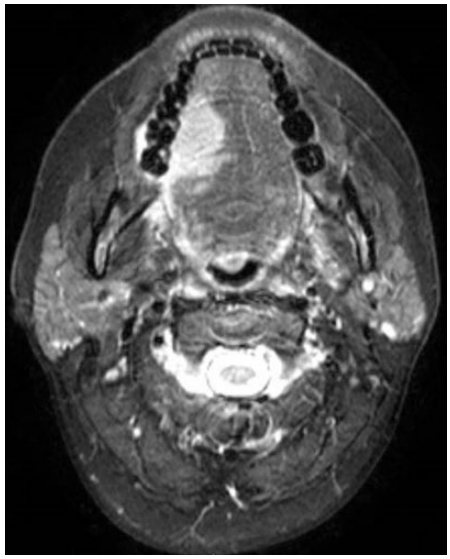
Histologically, the epulis of pregnancy resembles a pyogenic (telangiectatic) granuloma clinically and histologically. Dental plaque is the spark that can ignite the development of the lesion in addition to hormonal influence. The pregnancy-related hormonal changes that produce an exaggerated gingival

Figure 6.1 Epulis of pregnancy in a patient in her third trimester.

Box 6.7 Squamous carcinoma of the tongue – Case in point.

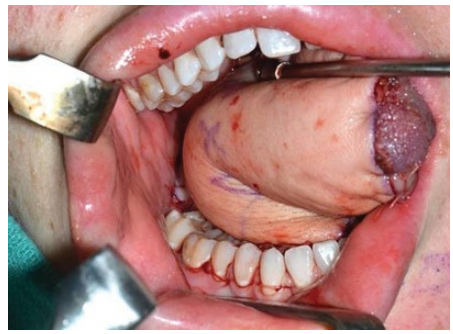
Patient: 29-year-old white female
Gravida: 3
Para: 2
Gestational age at diagnosis: 14 weeks
Biopsy diagnosis: SCCa with perineural invasion
Site: Right tongue, at site of preexisting erythroplakia

Smoker: No
Alcohol: Occasionally prior to pregnancy
Imaging: MRI – tumor close to midline –suspicious level 2A lymph node

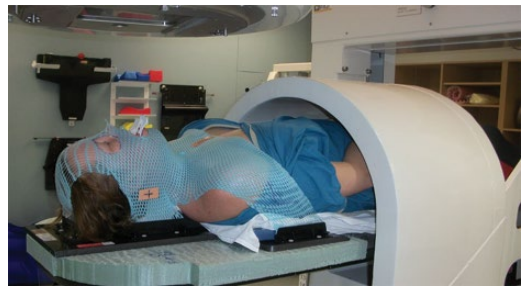


Stage: T4aN1Mx
Consultations: Maternal Fetal Medicine
Tumor Board
Medical Oncology
Radiation Oncology
Nutrition

Treatment plan: Surgery at week 16, chemoradiation
Procedure: Tracheostomy, right hemiglossectomy, bilateral neck dissection, levels I–IV, radial forearm free flap reconstruction
Two teams, duration 471 min, EBL 840 mL
Fetal monitoring: no distress
normal heart tones



Nutrition: NG feeding tube
Complications: neck wound infection
Management: cepodoxime, clindamycin (2wk)
Final pathology: clear margins, two lymph nodes positive at level IV with extracapsular spread (pT4aN2cMx)
Trach tube, NG tube removed post-op day 18
Radiotherapy with fetal shield, total fetal dose: 7 cGy



Chemotherapy: Carboplatin (severe nausea, vomiting)
Adjuvant therapy completed at 26 week of gestation
Normal uterine fetal growth on serial ultrasounds
Delivery of a vigorous (3118 g) male infant at 39 weeks
Two-year follow-up: no recurrence
At 2 years the child meets all developmental milestones

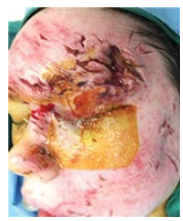
Box 6.9 Oral and maxillofacial trauma – Case in point.

Patient: 17-year-old female
Gravida: 1
Para: 0
Gestational age: 29 weeks
Cause of injuries: MVA
Contributing factors: Unrestrained passenger
Ejected through windshield
Condition on-scene: ambulating, agitated, combative

Transfer to first-line hospital
Condition: Altered mental status
Airway compromise
Management: Intubation
Imaging: CT scan (head, maxillofacial region, c-spine, thoracic spine, chest X-ray
Findings: no intracranial hemorrhage, no bony structural abnormalities
c-spine, thoracic spine, and chest X-ray
OB-GYN findings: cervix dilated 2 cm, contraction q 4–5 min
no vaginal bleeding
Patient given 1 dose of betamethasone in preparation for preterm labor

Transfer to CS Mott Children's Hospital
En route: hypotensive, bradycardic
received 3% saline solution

At CS Mott Children's Hospital ED
Vital signs: BP: 150/99, HR: 24, SpO_2: 99% on 100% FiO_2
Primary survey: extensive facial soft tissue trauma

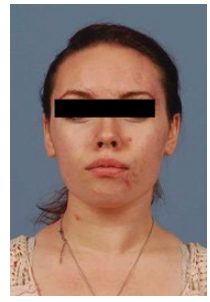
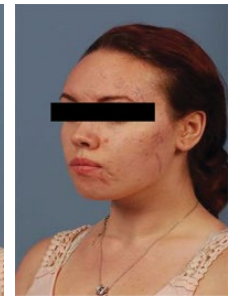




Secondary survey:
Large skin avulsion, left supraorbital rim, avulsion lateral to the left commissure, numerous forehead and cheek lacerations, complete function of CN VII,
bilateral epistaxis consistent with CT scan finding of minimally displaced nasal bone fracture, bilateral medial wall maxillary sinus fractures.

At CS Mott Children's Hospital ED
Neurologic exam: noncontributory – patient sedated
OB-GYN sterile vaginal exam: contractions q 1–2 min
Fetal heart sounds 130, occasionally variable
Repeat CT scan: no findings other than the nasal injury

Admission to Pediatric Surgical ICU
OB-GYN: Serial SVE and fetal monitoring
Obstetric clearance for surgical repair of facial injuries
Obstetricians, neonatology standing by

Operating Room
Surgical repair in progress
Fetal monitoring: bradycardia, HR: 90/min
SEV: progression of labor, birth center called
Emergent low transverse C-section performed
Infant APGAR score: 0 on presentation
1 at 1 min, 1 at 5 min
Umbilical cord pulse: not palpable
Infant CPR initiated, intubation, epinephrine, HR: >100/min
Infant NICU admission
Postop maternal condition: good
Infant condition: Treatment for respiratory distress
Mother discharged, infant discharged 1 month later
5-month follow-up:

Patient is to undergo scar revision in the near future

Figure 9.10 Upward pull is applied to deliver the posterior shoulder.

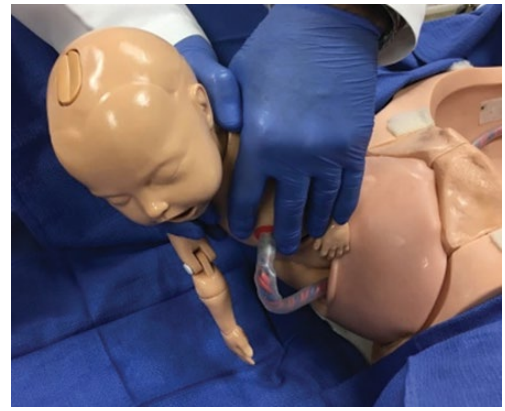
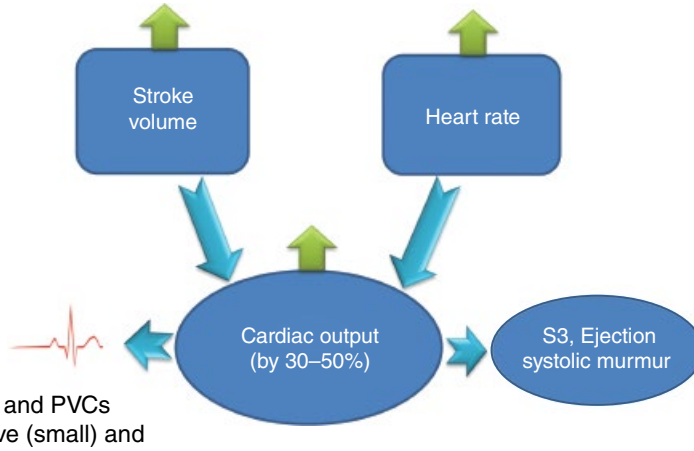


Figure 9.11 The head and torso are supported as the fetus continues to emerge through the vaginal opening.

Figure 9.12 With continuous support of the head and torso, the lower extremities are delivered.

Appendix 1

Cardiovascular Changes

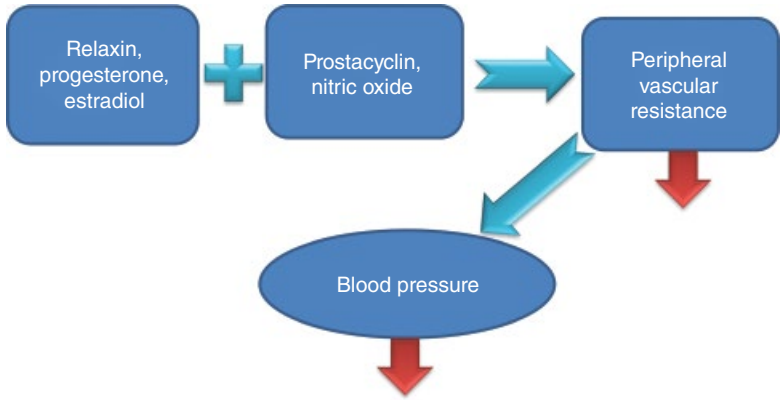


- PACs and PVCs
- Q wave (small) and inverted T wave in lead III
- ST-segment depression and T-wave inversion in the inferior and lateral leads
- Left-axis shift of QRS

Dental Management of the Pregnant Patient, First Edition. Edited by Christos A. Skouteris.

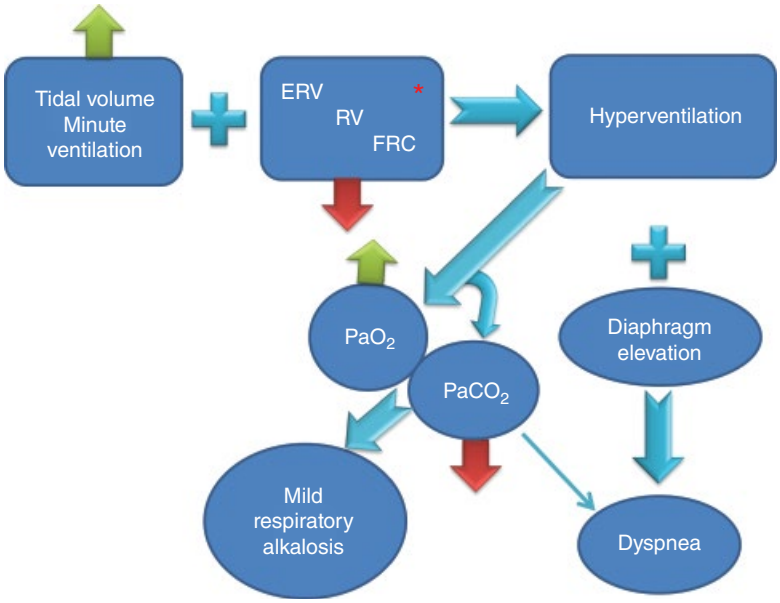
Appendix 2

Cardiovascular Changes



Appendix 3

Respiratory Changes



ERV: Expiratory reserve volume
RV: Residual volume
FRC: Functional residual capacity

Appendix 11

Most Important Physiologic Changes Per Trimester of Pregnancy