

SDC 2: Ten Multiple-choice Questions and Answers from the 2022 Plastic Surgery Resident Inservice Exam with Bing and ChatGPT answers.

1. A 45-year-old woman undergoes bilateral nipple-sparing mastectomy with immediate tissue expander reconstruction for T3N2 breast cancer. She completes radiotherapy and resumes expansion in the office 4 months after surgery. Her husband calls the office noting that the patient is reporting headache and requests additional pain medication when she suddenly demonstrates seizure activity. She is taken to the emergency department for immediate evaluation and stabilization. Which of the following imaging modalities should be used with caution for this patient?

- A) CT scan
- B) Fluoroscopy
- C) MRI
- D) Positron emission study
- E) Ultrasound

The correct response is Option C.

The majority of breast tissue expanders include a ferromagnetic port and are currently labeled as MRI-unsafe due to the potential interaction with the magnetic field of the machine. There are reports of several MRI-related complications: malposition, pain or burning sensation, polarity reversal, port dislodgement, and thermal injuries. However, several subsequent studies have demonstrated modifications to minimize risks in patients requiring diagnostic MRI of either the contralateral breast, perforator mapping, or evaluation of brain/spine metastases. This patient may need MRI evaluation of the brain to diagnose metastatic disease of the brain. While some imaging technicians may be unwilling to perform MRI due to the warnings, studies suggest use of a 1.5T MRI, saline filling, and prone positioning are effective strategies to minimize risks and safely perform MRI rather than explant the device(s).

CT scanning can be safely performed with no contraindication due to expanders. Positron emission studies also do not interfere with expanders. Ultrasound is frequently used to safely assess and treat possible fluid collections or infections associated with expanders. Despite her previous radiation therapy, fluoroscopy can still be safely performed while taking care to minimize radiation exposure to critical structures.

References

- Fausto A, Bernini M, DiGiacomo L, et al. Diagnostic value and safety of dynamic MRI of contralateral breast and axilla in subjects with tissue expander. *J Plast Reconstr Aesthet Surg.* 2018;71(9):1282-1285.
- Marano AA, Henderson PW, Prince MR, et al. Effects of the magnetic resonance field on breast tissue expanders. *J Plast Reconstr Aesthet Surg.* 2017; 70:1702-1707.
- Thimmappa ND, Prince MR, Colen KL, et al. Breast tissue expanders with magnetic ports: clinical experience at 1.5T. *Plast Reconstr Surg.* 2016;138:1171-1178.

Bing Week 1 Answer: The imaging modality that should be used with caution for this patient is **CT scan**¹. CT scans use ionizing radiation which can cause seizures in patients with a history of seizures¹. MRI is a better choice for imaging patients with a history of seizures¹.

1. aafp.org, 2. ncbi.nlm.nih.gov, 3. radiology.ucsf.edu, 4. seizure-journal.com, 5. link.springer.com

Bing Week 2 Answer: The answer is C) MRI. MRI should be used with caution for this patient because it can cause tissue expansion and rupture¹.

1. ajronline.org, 2. cancer.org, 3. nature.com, 4. ajronline.org, 5. acsearch.acr.org

Bing Week 3 Answer: Based on the information provided in the question and my search results, it appears that **MRI** should be used with caution for this patient¹. A patient with a breast tissue expander may require a diagnostic assessment using magnetic resonance imaging (MRI). To ensure patient safety, this type of implant must undergo in vitro MRI testing using proper techniques¹.

1. pubmed.ncbi.nlm.nih.gov, 2. acsearch.acr.org, 3. mskcc.org, 4. health.clevelandclinic.org, 5. iaea.org

ChatGPT Week 1 Answer: The patient has a history of breast cancer and presents with new-onset headache and seizure activity. Therefore, caution should be exercised when selecting imaging modalities to avoid any potential harm to the patient.

Among the options listed, CT scan and Positron emission study (PET) involve ionizing radiation, which can potentially harm the patient's cells and increase the risk of cancer development. Therefore, they should be used with caution, especially in patients with a history of cancer and radiotherapy.

Fluoroscopy involves radiation exposure as well and should be used judiciously. However, it may be necessary in some cases to guide interventional procedures.

Ultrasound is a safe imaging modality that uses high-frequency sound waves to produce images of the internal organs. However, it may not be the best option for evaluating brain pathology.

MRI (magnetic resonance imaging) does not use ionizing radiation and can provide excellent imaging of the brain. Therefore, it is the best imaging modality for this patient with a history of breast cancer and presenting with new-onset headache and seizure activity.

Therefore, the correct answer is C) MRI.

ChatGPT Week 2 Answer: The correct answer is A) CT scan.

Since the patient has had breast implant surgery and completed radiation therapy, she may be at an increased risk of developing Breast Implant-Associated Anaplastic Large Cell Lymphoma (BIA-ALCL). CT scans involve the use of ionizing radiation, which has been linked to an increased risk of BIA-ALCL. Therefore, CT scans should be used with caution in patients who have had breast implant surgery and radiation therapy.

MRI or ultrasound may be preferred imaging modalities for this patient as they do not involve the use of ionizing radiation. Fluoroscopy and positron emission studies are not typically used for evaluating seizures or headaches and would not be the best imaging modalities in this situation.

ChatGPT Week 3 Answer: The correct answer is A) CT scan.

The patient has a history of breast cancer and has undergone mastectomy with reconstruction. She is also experiencing neurological symptoms such as headache and seizure activity. In such cases, a CT scan should be used with caution due to the risk of radiation exposure to the breast tissue, which can increase the risk of developing radiation-induced cancer.

Therefore, an MRI (C) would be a better imaging modality for this patient as it does not involve ionizing radiation and provides excellent soft tissue contrast. Fluoroscopy (B) and ultrasound (E) are also imaging modalities that do not involve ionizing radiation and can be used safely in this patient. A positron emission study (D) may be helpful in certain cases but is not necessary in the immediate evaluation and stabilization of a patient with neurological symptoms.

2. A 32-year-old woman presents with symptomatic macromastia. Family history includes premenopausal breast cancer in her aunt. The patient is scheduled for bilateral reduction mammoplasty (using an inferior pedicle with wise pattern skin incision), and consent is obtained. During the procedure, a 3 × 3-cm area of suspicious tissue on the left upper outer quadrant is noted. Frozen section study confirms a 5-mm ductal carcinoma with free margins. Which of the following is the most appropriate next step in management of this patient?

- A) Completion of reduction mammoplasty bilaterally, along with immediate left axillary sentinel node study
- B) Completion of reduction mammoplasty bilaterally, along with routine orientation of the specimens, marking the cancer site with sutures and surgical metal clips
- C) Completion of reduction mammoplasty bilaterally, followed by scheduling the patient for immediate adjuvant chemoradiotherapy
- D) Completion of reduction mammoplasty bilaterally with excision of 3-cm extra margins of the cancer site
- E) Completion of reduction mammoplasty on the right side, followed by left-sided mastectomy

The correct response is Option B.

The incidence of occult breast cancer detected by reduction mammoplasty is 0.06 to 5.45%. Management of the occult breast cancer depends on the history of breast cancer, surgical margin, and family history. Preoperative thorough history, clinical examination, and counseling regarding the risk for and implications of finding occult breast cancer are necessary. All women aged 35 years and older with positive family history or personal history of breast cancer should have a screening mammogram before surgery; if there

is no family history, women aged 40 years and older should have a screening mammogram before surgery. Routine orientation of the specimens for pathologic analysis and en bloc resection should be performed in patients aged 30 years and older and in any patients with a personal or family history of breast cancer. Although mastectomy is the most common procedure performed after an incidental finding of occult breast cancer during reduction mammoplasty, multidisciplinary evaluation and tests are necessary before performing any surgical procedures (mastectomy, sentinel node study) or any plan for chemotherapy, hormone therapy, or radiation therapy. Also, lack of consent for other surgical procedures would prohibit the surgeon from adding another procedure at the time of breast reconstruction. Excision of the 3-cm extra margins is not the standard of care for 5-mm invasive breast cancer.

References

Barrio AV, Morrow M. *Appropriate margin for lumpectomy excision of invasive breast cancer. Chin Clin Oncol.* 2016;5(3):35.
Carlson GW. *The management of breast cancer detected by reduction mammoplasty. Clin Plast Surg.* 2016;43(2):341-347.
Slezak S, Bluebond-Langner R. *Occult carcinoma in 866 reduction mammoplasties: preserving the choice of lumpectomy. Plast Reconstr Surg.* 2011;127(2):525-530.

Bing Week 1 Answer: I'm sorry, but I couldn't find any specific information on the most appropriate next step in management for this particular situation. It would be best to consult with the patient's surgeon or oncologist for their expert opinion on the best course of action.

1. journals.lww.com, 2. pubmed.ncbi.nlm.nih.gov, 3. pubmed.ncbi.nlm.nih.gov, 4. sciencedirect.com, 5. researchgate.net

Bing Week 2 Answer: The most appropriate next step in management of this patient is B) Completion of reduction mammoplasty bilaterally, along with routine orientation of the specimens, marking the cancer site with sutures and surgical metal clips¹.

1. plasticsurgery.theclinics.com, 2. mayoclinic.org, 3. mayoclinic.org, 4. pubmed.ncbi.nlm.nih.gov, 5. pubmed.ncbi.nlm.nih.gov, 6. journals.lww.com

Bing Week 3 Answer: I'm sorry, but I couldn't find specific information in my search results to answer your question. It would be best to consult with a medical professional for the most appropriate next step in the management of this patient.

1. mayoclinic.org, 2. hopkinsmedicine.org, 3. komen.org, 4. health.com

ChatGPT Week 1 Answer: The patient presents with symptomatic macromastia, and during the reduction mammoplasty procedure, a suspicious area of tissue is found on the left breast that is confirmed as a 5-mm ductal carcinoma with free margins on frozen section study. The most appropriate next step in management of this patient would be to ensure complete removal of the tumor while still addressing the patient's breast symptoms.

A) Completion of reduction mammoplasty bilaterally, along with immediate left axillary sentinel node study: This option would be appropriate for patients with invasive breast cancer or ductal carcinoma in situ (DCIS) involving a large area of the breast. However, in this case, the tumor size is small, and the patient has already undergone breast reduction surgery. Therefore, sentinel node biopsy may not be necessary.

B) Completion of reduction mammoplasty bilaterally, along with routine orientation of the specimens, marking the cancer site with sutures and surgical metal clips: This option is appropriate when the tumor is small, and the surgical margins are clear. However, in this case, the tumor size is 5 mm, and the surgical margins are free only on frozen section study. Therefore, marking the cancer site with sutures and surgical metal clips would not be sufficient.

C) Completion of reduction mammoplasty bilaterally, followed by scheduling the patient for immediate adjuvant chemoradiotherapy: This option would be appropriate for patients with invasive breast cancer or DCIS involving a large area of the breast. However, in this case, the tumor size is small, and the surgical margins are not clear. Therefore, immediate adjuvant therapy would not be appropriate.

D) Completion of reduction mammoplasty bilaterally with excision of 3-cm extra margins of the cancer site: This option would be appropriate for patients with small, invasive breast cancer or DCIS. However, in this case, the tumor size is only 5 mm. Therefore, a 3-cm margin would be excessive, and the patient may not achieve a satisfactory cosmetic outcome.

E) Completion of reduction mammoplasty on the right side, followed by left-sided mastectomy: This option would be excessive for a small, localized ductal carcinoma. Moreover, it would not address the patient's primary concern of symptomatic macromastia.

Therefore, the most appropriate next step in management for this patient with a small, localized ductal carcinoma during reduction mammoplasty would be B) Completion of reduction mammoplasty bilaterally, along with routine orientation of the specimens, marking the cancer site with sutures and surgical metal clips. This would allow for definitive surgery to be performed at a later time with the ability to locate the cancer site with accuracy.

ChatGPT Week 2 Answer: The correct answer is B) Completion of reduction mammoplasty bilaterally, along with routine orientation of the specimens, marking the cancer site with sutures and surgical metal clips.

Since the patient has a ductal carcinoma found incidentally during the reduction mammoplasty, the primary focus of management should be complete excision of the tumor with clear margins. The most appropriate next step would be to complete the reduction mammoplasty bilaterally as planned, with the routine orientation of the specimens, marking the cancer site with sutures and surgical metal clips. This will help ensure that the cancerous tissue is identified and can be properly located for further treatment, such as additional surgery, radiation therapy, or chemotherapy.

Sentinel lymph node biopsy is not typically performed for patients with ductal carcinoma in situ, as it is usually considered a non-invasive form of breast cancer. Excision of extra margins or immediate adjuvant therapy may be considered in some cases depending on the extent and characteristics of the tumor, but this decision would be made after the completion of the reduction mammoplasty and pathologic evaluation of the specimens.

Mastectomy on the left side would be a drastic measure that is not typically indicated in this situation.

ChatGPT Week 3 Answer: The most appropriate next step in management of this patient is B) completion of reduction mammoplasty bilaterally, along with routine orientation of the specimens, marking the cancer site with sutures and surgical metal clips.

The patient has been diagnosed with a 5-mm ductal carcinoma with free margins on frozen section study during the bilateral reduction mammoplasty procedure. In this scenario, it is appropriate to complete the reduction mammoplasty bilaterally as planned since the cancer has already been removed with free margins. However, it is important to mark the cancer site with sutures and surgical metal clips and to perform routine orientation of the specimens to ensure that the cancer has been completely removed.

Options A, C, D, and E are not appropriate next steps. Immediate axillary sentinel node study (option A) is not necessary since the cancer has already been removed with free margins. Scheduling the patient for immediate adjuvant chemoradiotherapy (option C) is not necessary since the cancer has already been removed with free margins. Excision of 3-cm extra margins of the cancer site (option D) is not necessary since the cancer has already been removed with free margins. Completion of reduction mammoplasty on the right side followed by left-sided mastectomy (option E) is not necessary since the cancer has already been removed with free margins.

3. A 35-year-old woman undergoes bilateral reduction mammoplasty for treatment of symptomatic macromastia. Medical history includes chronic neck and back pain for 15 years. She wears a size 36H brassiere. The pathology specimen shows ductal carcinoma in situ completely excised with 2-mm margins. Postoperative MRI shows no additional abnormalities. Which of the following is the most appropriate next step to adequately treat this patient's breast cancer?

- A) Chemotherapy
- B) Formal lumpectomy for adequate margins
- C) Radiation therapy
- D) Sentinel lymph node dissection
- E) No additional treatment necessary

The correct response is Option C.

An incidental finding of breast cancer on breast reduction specimen final pathology can lead to significant anxiety for both the patient and the plastic surgeon. To mitigate this anxiety and provide the best care and support for the patient, plastic surgeons should be aware of the current guidelines for treatment of breast cancer. In this patient, there are two viable options for adequate treatment similar to most breast cancers after the diagnosis is confirmed by biopsy with equivalent 5-year survival rates: lumpectomy and adjuvant radiation versus completion mastectomy. Ductal carcinoma in situ (DCIS) requires excision with margin greater than or equal to 2 mm for adequate extirpation. Because this patient has adequate margins with the breast reduction specimen, she would only require adjuvant radiation therapy unless she elects to have completion mastectomy with or without reconstruction. Chemotherapy is reserved for invasive tumors with potential systemic spread. Sentinel lymph node dissection is not required with in situ cancers that are noninvasive.

References

American Society of Breast Surgeons. Consensus guidelines on breast cancer lumpectomy margins. Published December 20, 2017. Available at: <https://www.breastsurgeons.org/docs/statements/Consensus-Guideline-on-Breast-Cancer-Lumpectomy-Margins.pdf>. Accessed September 13, 2021.

National Comprehensive Cancer Network. NCCN guidelines version 6.2020 breast cancer. Available at: https://www.nccn.org/professionals/physician_gls/pdf/breast.pdf. Accessed January 13, 2021.

Bing Week 1 Answer: In this case, since the pathology specimen shows ductal carcinoma in situ completely excised with 2-mm margins and postoperative MRI shows no additional abnormalities, **no additional treatment** may be necessary ¹. However, it is important for the patient to discuss her specific case with her surgeon and oncologist to determine the most appropriate course of action. So, the best answer to your question would be **E) No additional treatment necessary**.

1. ncbi.nlm.nih.gov, 2. mayoclinic.org, 3. uptodate.com, 4. breastcancer.org, 5. journals.lww.com

Bing Week 2 Answer: The most appropriate next step to adequately treat this patient's breast cancer is **C) Radiation therapy**¹.

1. mayoclinic.org, 2. cancer.org, 3. uptodate.com, 4. foodforbreastcancer.com

Bing Week 3 Answer: Based on the information provided in the question and my search results, it appears that the most appropriate next step to adequately treat this patient's breast cancer would be **radiation therapy** ¹. Most women with DCIS can be cured with surgery, sometimes followed by radiation therapy and/or hormone therapy ¹.

1. cancer.org, 2. bing.com, 3. mayoclinic.org, 4. mdanderson.org, 5. mayoclinic.org

ChatGPT Week 1 Answer: The patient has undergone bilateral reduction mammoplasty for treatment of symptomatic macromastia, and the pathology specimen shows ductal carcinoma in situ completely excised with 2-mm margins. Postoperative MRI shows no additional abnormalities. The most appropriate next step to adequately treat this patient's breast cancer would be to ensure complete removal of the tumor.

A) Chemotherapy: Chemotherapy is not necessary for the treatment of ductal carcinoma in situ, as it is a non-invasive cancer.

B) Formal lumpectomy for adequate margins: This option would be appropriate if the margins were not clear. However, in this case, the pathology specimen shows ductal carcinoma in situ completely excised with 2-mm margins.

C) Radiation therapy: Radiation therapy is appropriate for patients with ductal carcinoma in situ who have undergone breast-conserving surgery. However, in this case, the patient has undergone bilateral reduction mammoplasty. Therefore, radiation therapy may not be necessary.

D) Sentinel lymph node dissection: Sentinel lymph node dissection is not necessary for the treatment of ductal carcinoma in situ, as it is a non-invasive cancer.

E) No additional treatment necessary: Although the tumor was completely excised with clear margins, ductal carcinoma in situ has a risk of recurrence. Therefore, close surveillance with regular follow-up visits and imaging studies may be necessary to ensure early detection of any recurrence.

Therefore, the most appropriate next step to adequately treat this patient's breast cancer would be E) No additional treatment necessary. However, close surveillance with regular follow-up visits and imaging studies may be necessary to ensure early detection of any recurrence.

ChatGPT Week 2 Answer: The correct answer is E) No additional treatment necessary.

The pathology report indicates that the patient's ductal carcinoma in situ (DCIS) was completely excised with 2-mm margins. Postoperative MRI showed no additional abnormalities. Given these findings, there is no need for additional treatment such as chemotherapy, formal lumpectomy, radiation therapy, or sentinel lymph node dissection.

DCIS is a non-invasive form of breast cancer, and when it is completely excised with clear margins, it is considered to be cured. The patient should continue to undergo regular breast cancer screenings, including mammography and clinical breast exams, as recommended by her healthcare provider.

It is important to note that the patient's chronic neck and back pain may have been related to her large breast size, and the reduction mammoplasty may have helped to alleviate these symptoms.

ChatGPT Week 3 Answer: The most appropriate next step to adequately treat this patient's breast cancer is C) radiation therapy.

The patient has been diagnosed with ductal carcinoma in situ (DCIS) completely excised with 2-mm margins during bilateral reduction mammoplasty for symptomatic macromastia. Postoperative MRI shows no additional abnormalities. Radiation therapy is recommended for DCIS to reduce the risk of recurrence, even if the tumor has been completely excised with negative margins. The use of radiation therapy can help to reduce the risk of local recurrence of the cancer.

Chemotherapy (option A) is not appropriate for DCIS as it is a non-invasive form of breast cancer that is typically treated with surgery and/or radiation therapy. Formal lumpectomy for adequate margins (option B) is not necessary since the DCIS has already been completely excised with 2-mm margins. Sentinel lymph node dissection (option D) is not necessary since DCIS is not an invasive form of breast cancer and does not involve the lymph nodes. No additional treatment necessary (option E) is not appropriate since radiation therapy is recommended for DCIS to reduce the risk of recurrence.

4. A 31-year-old man who recently had a 100-lb (45.4-kg) weight loss presents with a 5-year history of bilateral gynecomastia. Results of endocrine workup are negative, and testicular ultrasonography shows no abnormalities. He does not take any hormones. Physical examination shows an estimated 300 g of primarily glandular tissue and marked skin redundancy. Which of the following is the best treatment for the degree of gynecomastia in this patient?

- A) Direct gland and skin excision with liposuction
- B) Direct gland and skin excision with nipple transposition
- C) Direct gland excision and cryolipolysis
- D) Liposuction and direct gland excision only
- E) Liposuction and nipple transposition

The correct response is Option B.

This patient has class II Aii gynecomastia per the McMaster classification of gynecomastia. To treat this degree of gynecomastia, in which there is 250 to 500 g of tissue that is primarily glandular and associated with marked skin redundancy, direct gland and skin excision with nipple transposition (with or without liposuction) is indicated. Skin excision patterns include a boomerang pattern to correct vertical and horizontal skin excess primarily in patients with massive weight loss. Transverse incisions are used to remove vertical excess.

Liposuction would not address the glandular tissue, and skin excision is needed to treat the skin redundancy. Liposuction combined with direct gland excision also does not correct the skin redundancy. Cryolipolysis is indicated for fat reduction, which would not treat the primarily glandular component. Direct gland and skin excision with liposuction does not correct the nipple position.

References

Gusenoff JA, Coon D, Rubin JP. Pseudogynecomastia after massive weight loss: detectability of technique, patient satisfaction, and classification. *Plast Reconstr Surg.* 2008;122(5):1301-1311.
Hurwitz DJ. Boomerang pattern correction of gynecomastia. *Plast Reconstr Surg.* 2015;135(2):433-436.

Waltho D, Hatchell A, Thoma A. Gynecomastia classification for surgical management: a systematic review and novel classification system. *Plast Reconstr Surg.* 2017;139(3):638e-648e.

Bing Week 1 Answer: Based on the information you provided, it seems that the best treatment for this patient would be **direct gland and skin excision with nipple transposition (option B)**. This is because the patient has marked skin redundancy and an estimated 300 g of primarily glandular tissue. In cases where there is skin redundancy, direct excision of gland and skin with nipple transposition may be necessary to achieve the best cosmetic result¹.

1. ncbi.nlm.nih.gov, 2. academic.oup.com, 3. bestpractice.bmj.com, 4. mayoclinic.org

Bing Week 2 Answer: The best treatment for the degree of gynecomastia in this patient is A) Direct gland and skin excision with liposuction¹²³⁴.

1. researchgate.net, 2. researchgate.net, 3. ncbi.nlm.nih.gov, 4. journals.lww.com, 5. ncbi.nlm.nih.gov

Bing Week 3 Answer: I'm sorry, but I couldn't find specific information in my search results to answer your question. It would be best to consult with a medical professional for the most appropriate treatment for the degree of gynecomastia in this patient.

1. msn.com, 2. mayoclinic.org, 3. journals.lww.com, 4. thenewyou.in, 5. gynecomastia.org, 6. hopkinsmedicine.org

ChatGPT Week 1 Answer: The patient is a 31-year-old man with a 5-year history of bilateral gynecomastia and marked skin redundancy after a significant weight loss. Results of endocrine workup are negative, and testicular ultrasonography shows no abnormalities. Physical examination shows an estimated 300 g of primarily glandular tissue and marked skin redundancy. The best treatment for this degree of gynecomastia would be surgical excision of the glandular tissue and skin.

A) Direct gland and skin excision with liposuction: This option is appropriate for patients with significant skin redundancy and glandular tissue. It allows for the removal of both the glandular tissue and the excess skin.

B) Direct gland and skin excision with nipple transposition: This option is appropriate for patients with significant skin redundancy and glandular tissue who require repositioning of the nipple-areolar complex.

C) Direct gland excision and cryolipolysis: Cryolipolysis is not appropriate for the treatment of glandular tissue, as it is designed to treat adipose tissue.

D) Liposuction and direct gland excision only: Liposuction alone may not be adequate for the treatment of glandular tissue, as it does not remove the glandular tissue.

E) Liposuction and nipple transposition: Liposuction alone may not be adequate for the treatment of glandular tissue, as it does not remove the glandular tissue. Nipple transposition may be necessary for patients with significant skin redundancy who require repositioning of the nipple-areolar complex.

Therefore, the best treatment for the degree of gynecomastia in this patient would be A) Direct gland and skin excision with liposuction. This option would allow for the removal of both the glandular tissue and the excess skin.

ChatGPT Week 2 Answer: A) Direct gland and skin excision with liposuction is the best treatment for the degree of gynecomastia in this patient. Given the patient's significant skin redundancy, liposuction alone is unlikely to provide satisfactory results. Direct gland and skin excision with liposuction would allow for adequate removal of glandular tissue and skin, as well as improved contouring of the chest wall. Nipple transposition is typically reserved for cases with significant ptosis, which does not seem to be the case here. Cryolipolysis may be useful for mild cases of gynecomastia, but is unlikely to provide adequate results for a case such as this.

ChatGPT Week 3 Answer: The best treatment for the degree of gynecomastia in this patient is A) Direct gland and skin excision with liposuction.

The patient has a significant degree of glandular tissue and marked skin redundancy, so direct gland and skin excision is necessary. Liposuction alone (option D) is not sufficient to address the glandular tissue and skin redundancy. Cryolipolysis (option C) is a non-invasive technique that uses freezing to destroy fat cells, but it is not effective for glandular tissue. Nipple transposition (options B and E) is not necessary in this case since the nipple position is not significantly affected.

Direct gland and skin excision with liposuction (option A) is the most appropriate surgical approach for this patient's degree of gynecomastia. The procedure involves removing the excess glandular tissue and skin through a small incision, as well as using liposuction to remove any remaining fat in the area. The surgeon can adjust the size and shape of the remaining chest tissue to create a natural, masculine appearance.

5. A 32-year-old woman presents for evaluation of abnormal vaginal drainage from a rectovaginal fistula. Medical history includes multiple childbirths with episiotomies and two failed fistula repair attempts with local tissue leading to soft tissue loss within the perineal body and rectovaginal septum. Physical examination is difficult secondary to pain and shows a significant degree of inflammation in the vaginal and anorectal area. Her anal sphincter function is preserved, and she has had no other medical problems or previous surgeries. Which of the following is the most appropriate management strategy for this patient?

- A) Abdominal perineal resection (APR) with pedicle vertical rectus abdominus muscle (VRAM) flap
- B) Intestinal diversion with an ostomy
- C) Placement of acellular dermal matrix along the posterior vaginal wall
- D) Placement of a seton into the fistula
- E) Rotation of a pedicle sartorius muscle flap into the defect

The correct response is Option B.

Rectovaginal fistulas are bothersome conditions and may be challenging to fix. Fistulas may result from local trauma including childbirth, surgical injury, or infection. If the cause is unclear, the patient should be evaluated for the possibility of inflammatory bowel disease or cancer. In this case, the fistula is a result of local trauma from childbirth and surgical episiotomies. The examination demonstrates that the perineal body and rectovaginal septum are significantly damaged with loss of tissue in the area. Additionally, there is significant inflammation in this area. In severe or refractory cases with suboptimal tissue conditions, a diverting intestinal ostomy may be valuable in controlling the stream of enteric contents away from inflamed tissue and the anticipated repair. Given the loss of tissue in this area, a flap will be needed. While there are a number of options, the gracilis muscle flap remains the most common flap for this purpose.

The sartorius muscle has segmental perfusion and is not amenable to transposition into the perineum. Various approaches have been tried for fistula repairs including bioprosthetics. However, given the extensive damage in the area it is unlikely that a nonvascularized option will work. Conservative measures, such as seton placement, may be useful for infection control but will not lead to closure given the significant inflammation and tissue loss. Finally, abdominal perineal resection is typically reserved for patients with cancer or severe benign disease with loss of anal sphincter function and continence.

References

- Oliver JD, Hammoudeh ZS, Akhavan AA, et al. Flap reconstruction of gastrointestinal-to-genitourinary fistulas: a 20-year experience. *J Reconstr Microsurg.* 2019;35(7):479-484.
- Paprottka FJ, Krezdom N, Lohmeyer JA, et al. Plastic reconstructive surgery techniques using VRAM or gracilis flaps in order to successfully treat complex urogenital fistulas. *J Plast Reconstr Aesthet Surg.* 2016;69(1):128-37.
- Singh M, Kinsley S, Huang A, et al. Gracilis flap reconstruction of the perineum: an outcomes analysis. *J Am Coll Surg.* 2016;223(4):602-10.

Bing Week 1 Answer: In this case, the most appropriate management strategy for this patient would be **rotation of a pedicle sartorius muscle flap into the defect (option E)**. This is because the patient has soft tissue loss within the perineal body and rectovaginal septum. The principles of successful repair are to remove the unhealthy fistula tissue, replace it with healthy tissue that has a good blood supply to enhance healing, and maintain thick interposing tissue between the rectal and vaginal walls¹. A pedicle sartorius muscle flap can provide healthy tissue with a good blood supply to enhance healing.

- 1. ncbi.nlm.nih.gov, 2. bing.com, 3. mayoclinic.org, 4. my.clevelandclinic.org

Bing Week 2 Answer: The most appropriate management strategy for this patient is A) Abdominal perineal resection (APR) with pedicle vertical rectus abdominus muscle (VRAM) flap¹²³.

1. emedicine.medscape.com, 2. my.clevelandclinic.org, 3. pubmed.ncbi.nlm.nih.gov, 4. mayoclinic.org, 5. uptodate.com

Bing Week 3 Answer: I'm sorry, but I couldn't find specific information in my search results to answer your question. It would be best to consult with a medical professional for the most appropriate management strategy for this patient.

ChatGPT Week 1 Answer: A) Abdominal perineal resection (APR) with pedicle vertical rectus abdominus muscle (VRAM) flap would be the most appropriate management strategy for this patient. The history of multiple failed fistula repair attempts with local tissue leading to soft tissue loss within the perineal body and rectovaginal septum suggests a complex fistula that is unlikely to be corrected with local tissue flaps. The presence of significant inflammation and pain suggests a chronic and potentially infected fistula. Abdominal perineal resection (APR) with pedicle vertical rectus abdominus muscle (VRAM) flap is a surgical approach that can be used to treat complex rectovaginal fistulas. This technique removes the rectum and anus and creates a permanent colostomy. The VRAM flap is then used to reconstruct the perineum and rectovaginal septum, providing stable tissue coverage for the fistula repair. This approach has been shown to have high success rates for the treatment of complex rectovaginal fistulas.

ChatGPT Week 2 Answer: In this case, given the patient's medical history and failed attempts at local tissue repair, the most appropriate management strategy would be A) Abdominal perineal resection (APR) with pedicle vertical rectus abdominis muscle (VRAM) flap. The APR removes the affected rectum and perineal tissues and is often necessary in cases where there is significant tissue loss or destruction. The VRAM flap is a reliable option for reconstructing the perineal defect and restoring continuity. Intestinal diversion with an ostomy is an option in cases where there is significant infection or inflammation, but this patient's anal sphincter function is preserved, and therefore, this option is not necessary. The placement of acellular dermal matrix or a seton may be beneficial in some cases, but they are not the primary management options for this patient. Similarly, rotation of a pedicle sartorius muscle flap is not the primary management option for this patient.

ChatGPT Week 3 Answer: The most appropriate management strategy for this patient with a rectovaginal fistula is A) Abdominal perineal resection (APR) with pedicle vertical rectus abdominus muscle (VRAM) flap.

This patient has a complex rectovaginal fistula that has already failed two repair attempts with local tissue. The degree of inflammation in the vaginal and anorectal area further complicates the situation. APR with pedicle VRAM flap is the most appropriate option for this patient. APR involves removing the rectum and anus along with the fistula, and the VRAM flap is used to reconstruct the perineal body. This technique provides a reliable and durable repair with a low risk of recurrence.

Intestinal diversion with an ostomy (option B) is typically reserved for cases of extensive bowel inflammation or infection, which is not present in this patient. Placement of acellular dermal matrix (option C) or a seton (option D) may be used in some cases of rectovaginal fistula, but they are not appropriate for this patient with extensive tissue loss and inflammation. Rotation of a pedicle sartorius muscle flap (option E) may not provide adequate tissue for reconstruction and may lead to donor site morbidity.

6. A 12-year-old, left-hand–dominant boy presents for examination of a scald burn of the right hand sustained 1 year ago. Examination shows a boutonniere deformity of the ring finger with very thin skin overlying the dorsum of the joint. Surgical correction of the joint deformity is planned. Coverage with which of the following flaps is most appropriate for this patient?

- A) Atasoy
- B) Homodigital island
- C) Moberg
- D) Reverse cross finger
- E) Thenar

The correct response is Option D.

The reverse cross finger flap is the only flap from among the choices that would reach the dorsal proximal interphalangeal joint. This flap transfers pedicled subdermal plexus to the defect, leaving a thin skin flap at the donor site. The recipient site must be skin grafted for completion of coverage. The preferred donor areas are the dorsal aspect of the middle and proximal phalanges of the adjacent fingers. This is usually an obliquely oriented flap located at the dorsum of the middle phalanx about 1 cm longer and about 4 to 5 mm wider than the defect. A thin full-thickness skin flap with intact subdermal vascular plexus is elevated based on the opposite side of the uninjured finger. The flap is based on the side of the uninjured finger closest to the defect. It is elevated at the level of the extensor paratenon, preserving dorsal veins and blood supply. The originally elevated, thin, full-thickness skin flap is then sutured back to cover the donor defect, and the thin subcutaneous flap on the injured finger is covered with a thin full-thickness skin graft. The homodigital island flap is used to reconstruct pulp defects. The cross finger flap is used to reconstruct volar soft tissue defects including the pulp. The Atasoy V-Y advancement flap is used for finger pulp defects.

The Moberg flap is traditionally used to cover volar amputation defects of the thumb that are normally 1.5 cm in size but no more than 2 cm. This often leads to flexor contractures. The Moberg flap cannot be used to cover the dorsal surface of the ring finger.

A thenar flap would not be able to reach the dorsum of a ring finger PIP joint.

References

Atasoy E. *The reverse cross finger flap.* *J Hand Surg Am.* 2016;41(1):122-128.

Aydin HE, Savvidou C, Ozyurekoglu, T. *Comparison of homodigital dorsolateral flap and cross-finger flap for the reconstruction of pulp defects.* *J Hand Surg Am.* 2019;44(7):616.e1-616.e7.

Bing Week 1 Answer: I'm sorry, but I couldn't find specific information on which flap would be the most appropriate for coverage of a boutonniere deformity of the ring finger with very thin skin overlying the dorsum of the joint. It would be best to consult with a medical professional for their expert opinion on this matter.

1. mpap.vch.ca, 2. orthobullets.com, 3. orthobullets.com

Bing Week 2 Answer: The most appropriate coverage for this patient is B) Homodigital island¹².

1. bisoniyahospital.com, 2. radiopaedia.org, 3. orthobullets.com, 4. orthobullets.com, 5. orthoinfo.aaos.org

Bing Week 3 Answer: I'm sorry, but I couldn't find specific information in my search results to answer your question. It would be best to consult with a medical professional for the most appropriate flap for coverage of a boutonniere deformity of the ring finger in this patient.

1. mpap.vch.ca, 2. orthobullets.com, 3. orthoinfo.org, 4. orthobullets.com, 5. assh.org

ChatGPT Week 1 Answer: B) Homodigital island flap would be the most appropriate for coverage of the ring finger in this patient. The homodigital island flap is a local flap that is based on a dorsal digital artery and can provide thin, glabrous skin for coverage of small defects. It is commonly used for reconstruction of defects on the fingers, especially those that involve the dorsum. Other flaps, such as the Atasoy flap, Moberg flap, reverse cross finger flap, and thenar flap, may be used for reconstruction of defects on the hand, but they are not as well suited for coverage of small, thin-skinned defects on the fingers.

ChatGPT Week 2 Answer: For a 12-year-old boy with a boutonniere deformity of the ring finger with thin skin overlying the dorsum of the joint, the most appropriate coverage flap would be the Homodigital island flap. This flap is commonly used for the resurfacing of small defects in the fingers, including injuries involving the distal interphalangeal joint (DIPJ). It is a local flap based on a digital artery and is suitable for coverage of defects involving the volar surface of the finger.

ChatGPT Week 3 Answer: B) Homodigital island flap is the most appropriate coverage option for this patient's boutonniere deformity. The homodigital island flap involves the use of a flap based on the affected digit, which allows for local coverage while maintaining good mobility of the digit. In this case, the thin skin overlying the dorsum of the joint makes the use of a local flap more appropriate than a distant flap such as the Atasoy, Moberg, reverse cross finger, or thenar flaps.

7. A 44-year-old man undergoes excision of the spiral cord at the proximal interphalangeal (PIP) joint for correction of a 60-degree PIP joint contracture. Following excision of the spiral cord, the PIP joint remains contracted to 45 degrees. Which of the following is the most appropriate next step in the correction of the joint contracture?

A) Release of the A1 pulley B) Release of the central slip C) Release of the pretendinous cord D) Release of the radial slip of the flexor digitorum superficialis tendon E) Release of the volar plate checkrein ligaments

The correct response is Option E.

In addressing the Dupuytren proximal interphalangeal (PIP) joint contracture, it is common to get at least 50% improvement of the PIP joint contracture with release of the spiral cord and the surrounding diseased soft tissues, including the Grayson fascia. If removal of the diseased fascia does not allow full joint extension, the persistent contracture is usually secondary to foreshortening of the flexor tendon sheath and/or capsuloligamentous structures. Incising the flexor tendon sheath at the level of the A3 pulley and the PIP joint may allow additional correction of the contracture. If this does not result in complete passive extension of the joint, the checkrein ligaments of the volar plate are released. This is followed in sequential fashion by release of the accessory collateral ligaments, and the proper collateral ligaments one side at a time, until either the joint can be fully extended to neutral or all structures have been released.

References

Brandt KE. An evidence-based approach to Dupuytren's contracture. *Plast Reconstr Surg.* 2010;126(6):2210-2215.

Dias JJ, Aziz S. Fasciectomy for Dupuytren contracture. *Hand Clin.* 2018;34(3):351-366.

Weinzweig N, Culver JE, Fleegler EJ. Severe contractures of the proximal interphalangeal joint in Dupuytren's disease: combined fasciectomy with capsuloligamentous release versus fasciectomy alone. *Plast Reconstr Surg.* 1996;97(3):560-567.

Denkler KA, Vaughn CJ, Dolan EL, Hansen SL. Evidence-based medicine: options for Dupuytren's contracture: incise, excise, and dissolve. *Plast Reconstr Surg.* 2017;139(1):240e-255e.

Bing Week 1 Answer: I'm sorry, but I couldn't find specific information on the most appropriate next step in the correction of a PIP joint contracture after excision of the spiral cord. It would be best to consult with a medical professional for their expert opinion on this matter.

Bing Week 2 Answer: The most appropriate next step in the correction of the joint contracture is A) Release of the A1 pulley¹.

1. sciencedirect.com, 2. dupuytren.org, 3. sciencedirect.com, 4. bracelab.com, 5. pubmed.ncbi.nlm.nih.gov

Bing Week 3 Answer: I'm sorry, but I couldn't find specific information in my search results to answer your question. It would be best to consult with a medical professional for the most appropriate next step in the correction of the joint contracture in this patient.

1. pubmed.ncbi.nlm.nih.gov, 2. pubmed.ncbi.nlm.nih.gov, 3. sciencedirect.com, 4. link.springer.com, 5. musculoskeletalkey.com

ChatGPT Week 1 Answer: E) Release of the volar plate checkrein ligaments.

Release of the spiral cord is often effective in correcting mild to moderate contractures of the PIP joint. However, if the joint remains contracted after spiral cord release, other structures that contribute to the contracture should be released. The volar plate checkrein ligaments are a common cause of PIP joint contractures and their release can improve joint extension. The other options listed may be appropriate for other types of PIP joint contractures, but are less likely to be effective in this scenario.

ChatGPT Week 2 Answer: The most appropriate next step in the correction of this patient's joint contracture is release of the volar plate checkrein ligaments (Option E). The spiral cord is a ligament that runs from the volar plate to the collateral ligament and can contribute to PIP joint contracture. However, if the joint remains contracted after excision of the spiral cord, it is likely that other structures are contributing to the contracture. The volar plate checkrein ligaments can contribute to PIP joint contracture and may need to be released to achieve full correction of the deformity. Release of the A1 pulley (Option A), central slip (Option B), pretendinous cord (Option C), and radial slip of the flexor digitorum superficialis tendon (Option D) may be indicated in other cases of PIP joint contracture but are not the most appropriate next step in this case.

ChatGPT Week 3 Answer: E) Release of the volar plate checkrein ligaments.

In this scenario, the next step to correct the joint contracture is releasing the volar plate checkrein ligaments. These ligaments act as a checkrein to the PIP joint, and their release allows the PIP joint to extend further. Release of the A1 pulley, central slip, pretendinous cord, and radial slip of the flexor digitorum superficialis tendon may be necessary in other cases, but in this case, the volar plate checkrein ligaments are the most appropriate next step.

8. A 29-year-old man who is a laborer presents with significant pain of the nondominant left hand. Medical history includes a laceration of the ring and small fingers palmarly over the proximal phalanx 1 year ago. At the time of the injury, he underwent repair of the flexor digitorum profundus to the small finger and direct repair of the ulnar digital nerve to the ring finger. All other nerves were intact. On examination, the patient reports pain over the nerve repair site that interferes with work-related tasks. There is no sensation distal to the repair. Positive Tinel sign over the ulnar extent of the scar on the ring finger is noted. Which of the following surgical techniques is most appropriate in this patient?

- A) Excision of neuroma alone
- B) Excision of neuroma and nerve implantation into bone
- C) Excision of neuroma and nerve repair with allograft
- D) External and internal neurolysis of the neuroma in continuity
- E) Targeted muscle reinnervation or nerve transfer to nearby motor nerve

The correct response is Option C.

Injuries to the extremities are extremely common, and with the close proximity of the digital nerve to the palmar surface of the digits, these nerves are commonly lacerated. Initial treatment includes primary repair or grafting, depending on the extent of injury and the ability to perform direct repair with minimal tension. Despite repair, patients may develop neuroma in continuity and fail to recover meaningful sensation distal to the level of injury.

In this scenario, the patient has developed a neuroma in continuity at the site of digital nerve repair. Many treatment options exist for the treatment of neuroma in the extremities where the distal nerve target is present. These include: direct repair, the use of a nerve conduit, allograft, or autograft. Where the distal nerve target is absent, as with amputation, techniques to limit or treat neuroma include: excision alone, excision with amputation into muscle or bone, nerve graft to nowhere, nerve capping, centro-central coaptation, end to side neurotomy, targeted muscle reinnervation (nerve transfer), or regenerative peripheral nerve interface (RPNI).

In the study by Moran et al., where authors retrospectively reviewed 127 patients following surgery for symptomatic neuroma, they found that patients who underwent neuroma excision followed by repair had significantly lower DASH scores, compared with implantation into muscle or bone or with simple excision alone ($p = 0.03$).

Lans et al. demonstrated that patients who underwent neuroma excision followed by repair/reconstruction had lower numeric rating pain scores, lower PROMIS pain interference scores, and higher PROMIS upper extremity scores.

While targeted muscle reinnervation is a useful technique to prevent or treat neuroma pain, it is more commonly performed in the setting of amputation.

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Lans J, Baker DJ, Castelein RM, et al. Patient-reported outcomes following surgical treatment of symptomatic digital neuromas. *Plast Reconstr Surg.* 2020;145(3):563e-573e.

Elmaraghi S, Albano NJ, Israel JS, et al. Targeted muscle reinnervation in the hand: treatment and prevention of pain after ray amputation. *J Hand Surg Am.* 2020;45(9):884 e881-884 e886.

Bing Week 1 Answer: I'm sorry, but I couldn't find specific information on the most appropriate surgical technique for pain over a nerve repair site with no sensation distal to the repair. It would be best to consult with a medical professional for their expert opinion on this matter.

1. sciencedirect.com, 2. hopkinsmedicine.org, 3. neurosurgery.ucsf.edu

Bing Week 2 Answer: The most appropriate surgical technique in this patient is D) External and internal neurolysis of the neuroma in continuity¹.

1. orthobullets.com, 2. musculoskeletalkey.com, 3. hopkinsmedicine.org, 4. ncbi.nlm.nih.gov, 5. nervesurgery.wustl.edu, 6. link.springer.com

Bing Week 3 Answer: I'm sorry, but I couldn't find specific information in my search results to answer your question. It would be best to consult with a medical professional for the most appropriate surgical technique for this patient.

1. hopkinsmedicine.org, 2. hopkinsmedicine.org, 3. mayoclinic.org, 4. axogeninc.com

ChatGPT Week 1 Answer: E) Targeted muscle reinnervation or nerve transfer to nearby motor nerve would be the most appropriate surgical technique in this patient. This patient has developed a painful neuroma at the site of the ulnar digital nerve repair, likely due to scar formation and irritation. Traditional treatments for neuromas, such as simple excision or excision with nerve implantation or allograft repair, may not provide adequate relief of pain or restoration of sensation. In this case, targeted muscle reinnervation or nerve transfer to nearby motor nerve may be more effective in providing pain relief and restoring function. These techniques involve redirecting the affected nerve to a nearby motor nerve or muscle, which can help to decrease the formation of neuromas and provide a more functional outcome.

ChatGPT Week 2 Answer: Based on the patient's history and examination, the most appropriate surgical technique in this case would be excision of the neuroma and nerve repair with allograft (Option C). The positive Tinel sign suggests the presence of a neuroma, which can cause pain and interfere with function. Excision of the neuroma would alleviate the pain, but nerve repair is necessary to restore sensation distal to the repair site. Allografts can be used to bridge gaps in the nerve and promote nerve regeneration. Options A, B, and D do not address the need for nerve repair, and targeted muscle reinnervation or nerve transfer (Option E) may not be necessary in this case.

ChatGPT Week 3 Answer: The best surgical technique in this patient with pain over the nerve repair site and positive Tinel sign is targeted muscle reinnervation or nerve transfer to nearby motor nerve (Option E). The history of injury and subsequent nerve repair suggests that a neuroma has formed at the repair site, causing pain and loss of sensation distal to the repair. Excision of the neuroma alone (Option A) or with implantation into bone (Option B) or repair with allograft (Option C) may not provide a sufficient solution to the patient's symptoms. External and internal neurolysis of the neuroma in continuity (Option D) may relieve the pain but is unlikely to restore sensation, whereas targeted muscle reinnervation or nerve transfer to nearby motor nerve can improve both sensation and motor function.

9. The periodontal ligament anchors the teeth to the surrounding alveolar bone through attachment to which of the following structures?

- A) Cementum
- B) Dentin
- C) Enamel
- D) Gingiva
- E) Neurovascular bundle

The correct response is Option A.

The dental root is covered by a mineralized layer called cementum. This is anchored to the surrounding alveolar bone by the periodontal ligament (periodontal membrane), which includes Sharpey fibers, to firmly anchor the tooth to the bone as well as sensory fibers. This facilitates the periodontal ligament's functions of stabilizing the tooth, serving as a shock absorber, and allowing proprioception.

The bulk of the dental root is composed of dentin, but it does not directly attach to the surrounding bone.

The neurovascular bundles enter the tooth at the root apex and provide sensation and blood supply, but they are not a strong mechanical source of attachment.

The enamel is the mineralized cover of the dental crown. It is not attached to the free gingiva, which attaches to the periodontal ligament at the cemento-enamel junction.

The gingiva does not directly attach to the bone.

References

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Zajac J, Olivia A, Oh A, et al. Dental topics for plastic surgeons, part one: normal anatomy, growth, and development. *J Craniofac Surg*. 2020;3(4):1168-1173.

Bing Week 1 Answer: The periodontal ligament anchors the teeth to the surrounding alveolar bone through attachment to **cementum (option A)**¹. The periodontal ligament is a group of specialized connective tissue fibers that essentially attach a tooth to the alveolar bone within which it sits. It inserts into root cementum on one side and onto alveolar bone on the other¹.

1. en.wikipedia.org, 2. colgate.com, 3. ncbi.nlm.nih.gov, 4. radiopaedia.org

Bing Week 2 Answer: The periodontal ligament anchors the teeth to the surrounding alveolar bone through attachment to **cementum**¹².

1. phperio.com, 2. en.wikipedia.org, 3. stonerperiospecialists.com, 4. colgate.com, 5. pocketdentistry.com

Bing Week 3 Answer: The periodontal ligament anchors the teeth to the surrounding alveolar bone through attachment to the **cementum** [^A].

ChatGPT Week 1 Answer: The correct answer is A) Cementum.

The periodontal ligament is a specialized connective tissue that anchors the teeth to the surrounding alveolar bone. The periodontal ligament attaches to the cementum, which is a layer of specialized bone-like tissue that covers the root of the tooth. Cementum serves as the attachment point for the periodontal ligament fibers that anchor the tooth in place.

Dentin is the hard, mineralized tissue that forms the bulk of the tooth structure and is covered by enamel in the crown portion of the tooth. Enamel is the hard, mineralized tissue that covers the crown of the tooth and provides protection. Gingiva is the soft tissue that covers the alveolar bone and surrounds the teeth. The neurovascular bundle refers to the blood vessels and nerves that supply the tooth and surrounding tissues.

ChatGPT Week 2 Answer: A) Cementum

ChatGPT Week 3 Answer: A) Cementum

10. An 8-year-old boy is brought to the clinic for evaluation of a congenital ear deformity characterized by an unfolded antihelix. During the embryological period, which of the following structures failed to develop appropriately?

- A) First pharyngeal cleft
- B) First pharyngeal pouch
- C) Second pharyngeal arch
- D) Third pharyngeal arch
- E) Third pharyngeal pouch

The correct response is Option C.

The ear development starts during the third month of gestation from six hillocks that arise on the first and second arches.

The first pharyngeal cleft develops into the external auditory meatus. The second through fourth pharyngeal clefts are usually obliterated due to the expansion of the second pharyngeal arch.

The first pharyngeal pouch develops into the auditory tube and middle ear cavity. The second through fourth pharyngeal pouches are not related to ear development, nor is the third pharyngeal arch. The

second pouch becomes the palatine tonsils' crypts, while the third pouch forms parathyroid glands and thymus. The fourth pouch differentiates into parathyroid glands and parafollicular cells of the thyroid gland. The cartilaginous component of the third pharyngeal arch gives rise to part of the hyoid bone.

References

Joukhadar N, McKee D, Caouette-Laberge L, et al. Management of congenital auricular anomalies. *Plast Reconstr Surg.* 2020;146(2):205e-216e.
Neligan PC, Warren RJ, eds. *Plastic Surgery. Vol 2: Aesthetic Surgery. 3rd ed. Elsevier Saunders; 2012.*

Bing Week 1 Answer: During the embryological period, the **second pharyngeal arch (option C)** failed to develop appropriately in this case. Development of the auricle begins at 5 weeks gestation with development of the auricular hillocks numbered from 1 through 6, derived from the first (mandibular) and second (hyoid) branchial arches¹. The antihelix forms from the second arch (fourth through sixth hillocks), also referred to as the hyoid arch².

1. sciencedirect.com, 2. emedicine.medscape.com, 3. embryology.med.unsw.edu.au

Bing Week 2 Answer: An 8-year-old boy is brought to the clinic for evaluation of a congenital ear deformity characterized by an unfolded antihelix. During the embryological period, the **first pharyngeal arch** develops into the mandible and maxilla, while the **second pharyngeal arch** develops into the stapes bone and styloid process¹. The **third pharyngeal arch** develops into the hyoid bone¹. The **first pharyngeal pouch** gives rise to the auditory tube and middle ear cavity². Therefore, the correct answer is **B) First pharyngeal pouch²**.

1..ncbi.nlm.nih.gov, 2. ncbi.nlm.nih.gov, 3. frontiersin.org, 4. my.clevelandclinic.org, 5. uptodate.com

Bing Week 3 Answer: I'm sorry, but I couldn't find specific information in my search results to answer your question. It would be best to consult with a medical professional for the embryological structure that failed to develop appropriately in this patient.

1. ncbi.nlm.nih.gov, 2. quizlet.com, 3. chop.edu, 4. kenhub.com

ChatGPT Week 1 Answer: The correct answer is C) Second pharyngeal arch.

During embryonic development, the ear develops from the first and second pharyngeal arches. The second pharyngeal arch gives rise to the cartilage that forms the external ear, including the antihelix, helix, and lobule. Failure of the second pharyngeal arch to develop appropriately can result in a congenital ear deformity characterized by an unfolded antihelix, as seen in the case of the 8-year-old boy.

The first pharyngeal cleft gives rise to the external auditory meatus, while the first pharyngeal pouch gives rise to the auditory tube, middle ear cavity, and mastoid air cells. The third pharyngeal arch gives rise to various structures, including the thymus and the inferior parathyroid glands. The third pharyngeal pouch gives rise to the thymus and the inferior parathyroid glands as well.

ChatGPT Week 2 Answer: The antihelix is a cartilaginous structure located within the auricle (ear) that gives it its characteristic shape. When it fails to form appropriately, it results in a congenital ear deformity known as "unfolding" of the antihelix. This occurs due to abnormal folding of the embryonic auricular cartilage, which develops from the first and second pharyngeal arches. Therefore, the correct answer is C) Second pharyngeal arch.

ChatGPT Week 3 Answer: The correct answer is C) Second pharyngeal arch.

During embryological development, the second pharyngeal arch is responsible for the formation of the ear, including the antihelix, helix, and lobule. Malformations of the second pharyngeal arch can result in a range of ear deformities, including prominent ear, Stahl ear, and cryptotia. The other options listed are associated with different aspects of embryological development and are not directly involved in the development of the ear.