

Abstract:

Each year there are more new cases of skin cancer than the combined incidence of cancers of the breast, prostate, lung and colon (1). Basal cell carcinoma is the most common form of skin cancer and squamous cell carcinoma is the second most common form. Melanoma accounts for only 5% of all skin cancers, but it is the most deadly, accounting for 75% of all skin cancer deaths (2).

There are 4 major types of melanomas, each with different potential for metastasis. A wide excision of a large arm mass, biopsy proven melanoma, is submitted for pathological evaluation. The morphological features suggest that the mass is an aggressive type of melanoma, the Nodular type. Sections are submitted for microscopic verification and evaluation of the tumor's aggressiveness.

Background:

The case is a 56 year old Caucasian male who presented with a profound macro-mass of his right elbow, biopsy proven melanoma. His past medical history included an excised invasive squamous cell carcinoma of the left neck. A wide local excision of the melanoma was performed using 3 cm plus margins (Fig 1). A sentinel node and deep biopsy of the triceps muscle were also performed.

The gross appearance was that of a dome-shaped, exophytic, tan-red discolored mass, suggesting that the melanoma is of the Nodular type.

Rationale and Hypothesis:

Melanoma is a malignant tumor of melanocytes. Although it is one of the less common types of skin cancer, its features of aggressive local growth and metastasis make it to account for 75% of all skin cancer related deaths. Melanocytes are normally present in the skin and produce the dark skin pigment. Damage to melanocytes' DNA, such as from ultraviolet light found in sunlight or tanning beds can cause melanocytes to divide in an uncontrolled manner. Typically, melanoma begins to proliferate as a radial growth, limited to the dermo-epidermal junction. This phase does not have invasive potential and the tumor is less than 1 mm thick. The next phase is vertical growth, as the melanoma acquires invasive potential. The tumor begins to involve deeper layers of the dermis and cells can get into the blood stream.

There are 4 major types of melanoma with distinct characteristics and potential for metastasis. The most common type is *Superficial Spreading Melanoma* that begins as an asymmetric pigmented macule with irregular borders and color variations. The second most common type is *Nodular Melanoma*. It presents as a dark, red, or skin-colored nodule that skips the radial growth phase and goes directly into the vertical phase, creating a dome-shaped appearance. Since Nodular Melanoma skips the radial non-invasive stage, it grows quicker and metastasizes early. The third type is *Lentigo Maligna Melanoma*, which is usually found on the head and neck region and presents as a large flat tan asymmetric patch. It remains confined to the epidermis for months to years before reaching its invasive potential. The fourth and rarest type is *Acral Lentiginous Melanoma*, which is similar to Lentigo Maligna, but occurs on the hands, feet, and nail beds.

The dome-shaped and skin-colored appearance of the mass on the skin excision specimen suggests a Nodular type of melanoma and a high metastatic potential. Note that the ABCD (Asymmetry, Border, Color, Diameter) clinical criteria for the diagnosis of melanoma do not apply to most Nodular melanomas since they can be symmetrical, poorly pigmented, and even smooth and well defined.

Methodology:

Although the specimen was only oriented with a single stitch marking the medial border, patient history indicated the mass to be on the posterior right arm, overlying the triceps muscle, allowing for superior and inferior borders to be identified. The entire mass insertion site with deep margin was submitted for histology, as illustrated in Fig 2-3. The insertion site was serially sectioned and the cross sections trisected to fit into cassettes. The remaining superior and inferior margins were shaved and submitted in the manner of tips.

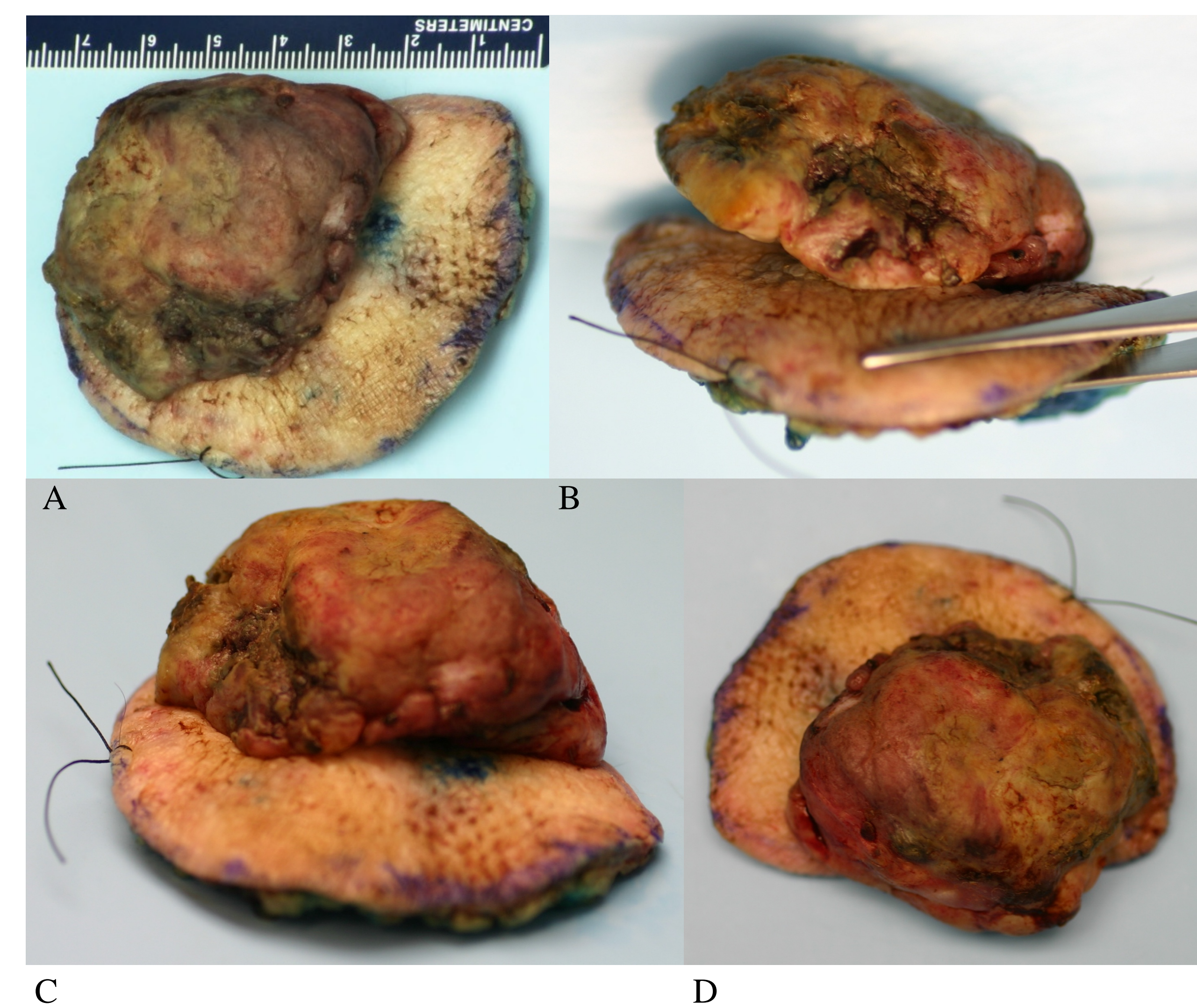


Figure 1. Photographs of the wide skin excision specimen. **A.** Oblique view demonstrating size. **B.** Side view demonstrating fungating growth. **C.** Side View. **D.** Top-down view demonstrating mass overlapping the excised skin.

Figure 2. Diagram of skin ellipse with mass insertion and sections taken. The insertion point is 1.7 cm from the closest peripheral margin (superolateral), submitted entirely and trisected. The remaining peripheral margins are shaved.

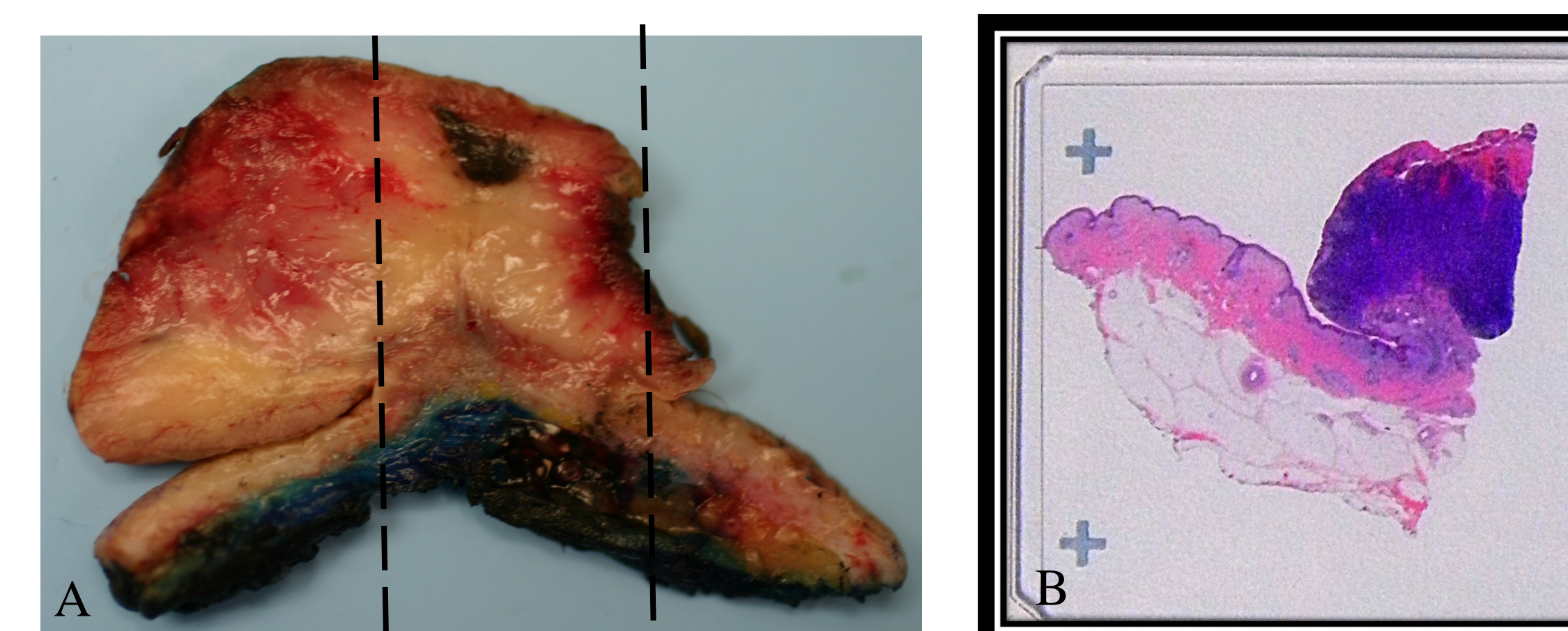
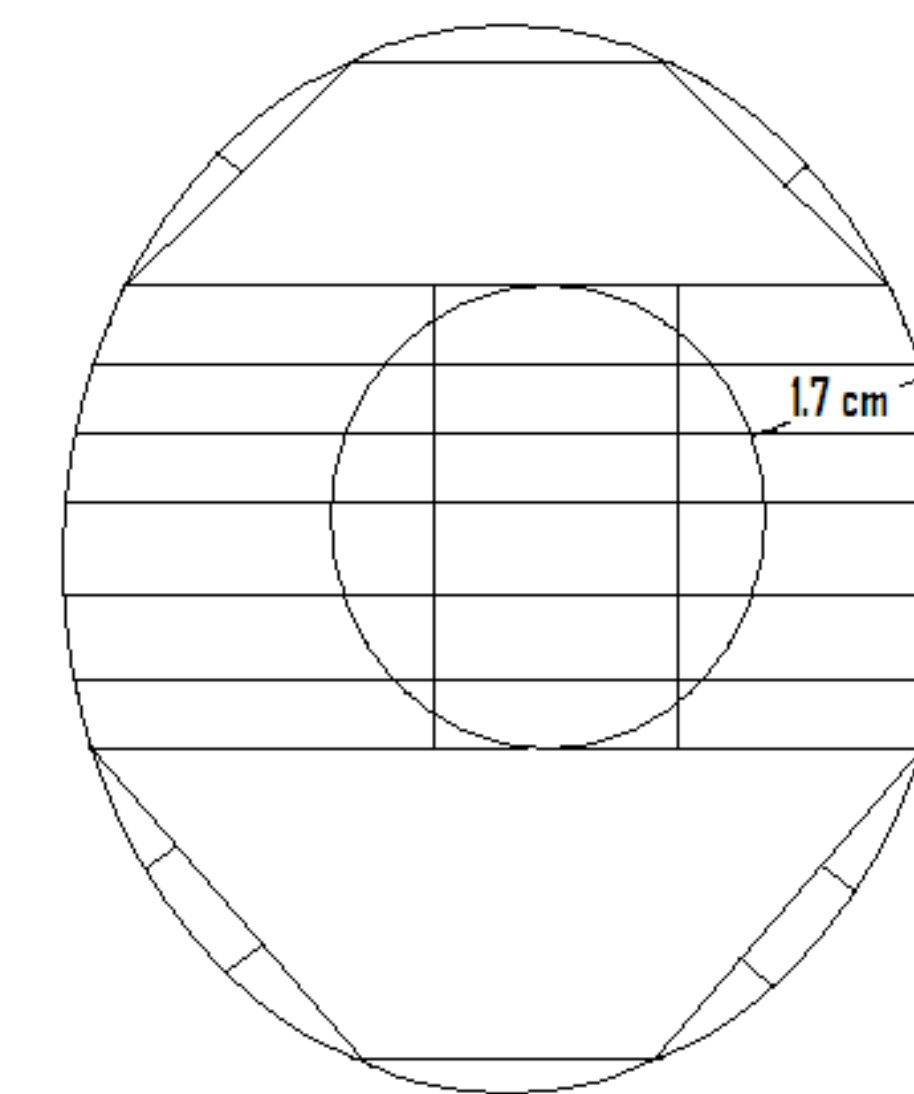


Figure 3. Full-thickness cross-section of mass insertion with deep, medial, and lateral margins. **A.** Dashed lines demonstrate where the cross-section was trisected to fit into cassettes. **B.** An example of H&E stained trisected cross-section.

Gross Description: The specimen is received in formalin in a container labeled with the patient's name and "right arm mass, stitch marks medial". It consists of a 7.3 x 5.2 cm tan-white skin ellipse excised to a maximum depth of 1.3 cm. A black stitch identifies the medial long margin. The medial margin is inked blue and the lateral margin is inked black. There is an eccentrically located 5.3 x 4.5 x 2.6 cm exophytic, fungating, lobulated, tan-red discolored rubbery mass, 1.7 cm from the superolateral long margin. The specimen is sectioned to reveal a yellow-tan, focally hemorrhagic cut surface. The mass does not appear to invade into the blue dye stained deep tissue. Representative sections are submitted as follows:

B1-superior tip

B2-inferior tip

B3 through B20-superior to inferior trisected cross sections of insertion area of mass, with medial and lateral margins (B3-B4-B5, B6-B7-B8, B9-B10-B11, B12-B13-B14, B15-B16-B17, B18-B19-B20: paired)

B21 and B22-superomedial margin, superior to inferior (shave)

B23 and B24-superolateral margin, superior to inferior (shave)

B25 through B27-inferomedial margin, superior to inferior (shave)

B28 and B29-inferolateral margin, superior to inferior (shave)

Microscopic Findings:

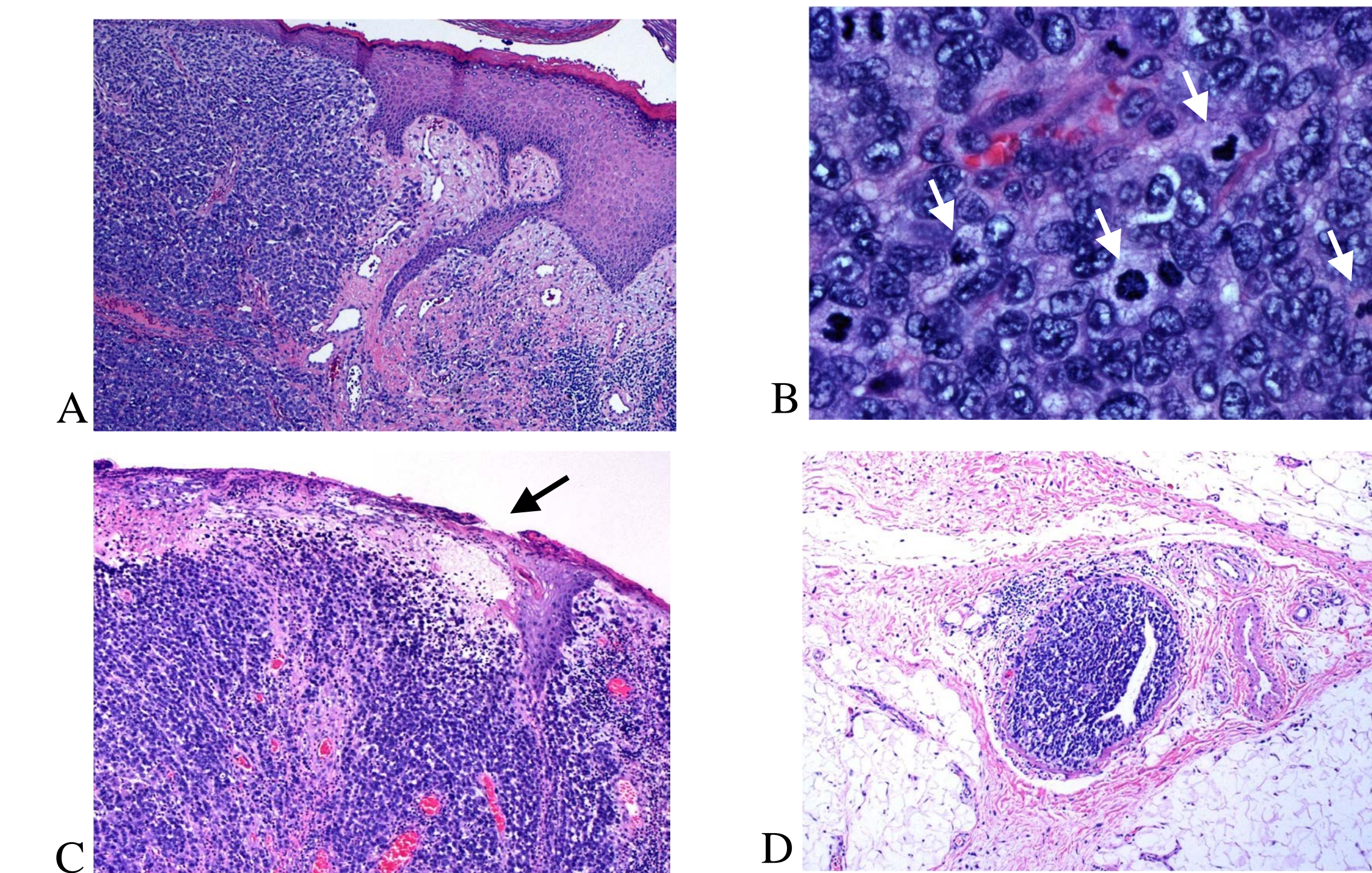


Figure 4. Microscopic features of the specimen. **A.** The dark staining melanocytes demonstrate a pushing border growth with no adjacent radial growth phase. **B.** Multiple mitoses (arrows). **C.** Ulceration (arrow). **D.** Vascular invasion.

Microscopic findings confirmed the melanoma to be of Nodular type (Fig 4a). There were 5 mitoses per 1 mm squared (Fig 4b), with an ulcerative component (Fig 4c) and vascular invasion (Fig 4d). The peripheral and deep margins were clear (17 mm from peripheral and 6 mm from deep). Breslow's thickness was determined as 17 mm. There was no tumor seen in the triceps muscle biopsy, however, the sentinel node contained a micro-metastatic (4 mm) melanoma.

Discussion and Conclusion:

The most important prognostic factors of melanoma are T stage, ulceration, and Breslow's depth. Breslow's depth is measured from the granular layer of the epidermis down to the deepest point of invasion. Tumors with higher Breslow's depth are more likely to invade lymphatic or blood vessels. A thickness of >4 mm (in this case, 17 mm) gives the patient a 50% survival chance in 5 years. A tumor of the same Breslow's depth but with ulceration is more aggressive and behaves like a tumor of a greater depth with a worse prognosis. The T stage is calculated by tumor thickness and the presence of ulceration increases the T stage by one level.

Of the 4 types of melanoma, the Nodular type is the most aggressive. Unlike the other types of melanoma, it skips the non-invasive radial growth phase to go straight into vertical growth. The rapid growth in all directions gives it the dome-shaped appearance and increases the likelihood of vascular invasion. Although all of the margins of the excision were clear, the aggressive nature of a Nodular Melanoma foreshadows the possibility of distant organ metastases and a grave prognosis for the host.

References:

- American Cancer Society. *Cancer Facts & Figures 2009*. Atlanta: American Cancer Society; 2009
- "The Burden of Skin Cancer." National Center for Chronic Disease Prevention and Health Promotion. 13 May 2008.
- SEER Cancer Statistics Review, 1975-2004 (NCI) http://seer.cancer.gov/csr/1975_2004/