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Comment and Controversy
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Variations in pain perception during the menstrual cycle: implications for esthetic procedures

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Abstract Variations in pain perception have long been studied in the medical literature, especially for women in regards to their menstrual cycle. Anecdotally, women can be more sensitive to painful stimuli from cosmetic procedures during their menses; however, no studies have thoroughly examined variations in pain perception for women in esthetic medicine. In an effort to look into this phenomenon, we review the current literature on this topic by examining studies from other medical subspecialties and also discuss implications for clinical practice.

Introduction

Variations in pain perception between sexes has continued to be a matter of controversy in the medical community. Epidemiologic and clinical data suggest that overall, women experience heightened pain sensitivity compared to men. Various mechanisms are believed to play a role in this disparity, including genetics, endogenous opioids, psychosocial factors, and sex hormones.[1]

In several painful chronic conditions, such as rheumatoid arthritis, fibromyalgia, migraines, and temporomandibular disorders, worsening clinical manifestations have been clinically associated with certain phases of the female reproductive cycle. This suggests a role for estrogen or progesterone in the regulation of inflammation and pain sensation.[2]

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Although many studies have attempted to elucidate how hormonal variations during the menstrual cycle can affect pain perception, there has been no shared consensus as to whether fluctuations in hormones produce any effect at all. Anecdotally, it is our experience that women can be more sensitive to painful stimuli from cosmetic procedures, such as injectable volumizing agents (fillers) and esthetic laser treatments, during their menses. As a result, we sought to further elucidate this phenomenon by reviewing the current literature to offer additional insights for clinical practice.

Clinical review

Among the studies supporting a hormonal influence to pain perception, one group examined 72 women who underwent elective surgery under general anesthesia.[3] Patients were divided into two groups depending on whether they were in their

follicular phase (cycle days 8-12) or luteal phase (cycle days 20-24). After evaluating pain using a 10-point Likert scale, they found the pain score to be greater in the luteal phase, although there were no statistical differences.

Similarly, another group studied the relationship of menstrual cycle phases to pain ratings.[4] In this study, 80 women were divided into two groups depending on whether they were in the follicular or luteal phase. Each patient was administered rocuronium by injection and an assessment of withdrawal movement to injection was used as a surrogate for the ability to sense pain. Results from this study showed a significant increase in pain sensitivity during the luteal phase compared with the follicular phase.

In an observational, single-center study, the influence of menstrual cycle phases on venipuncture-associated pain in women undergoing surgery under anesthesia was studied.[5] Similar to the previous studies, this study divided the patients into two groups based upon either the luteal or follicular phase. Pain was assessed every 2 hours after the surgery for a total of 24 hours, and the results of the 60 women demonstrated overall decreased pain scores in the follicular group with statistical significance at a few time points. The researchers concluded that gonadal hormones may influence perioperative pain perception.

In a study of 20 women with chronic pain, participants were instructed to approximate pain intensity on each day of their menstrual cycle using a questionnaire.[6] The menstrual cycle was divided into five phases: Phase 1 (days 1-5 as menstrual phase), Phase 2 (days 6-11 as follicular phase), Phase 3 (days 12-16 as periovulatory phase), Phase 4 (days 17-23 as luteal phase), and Phase 5 (days 24-28 as premenstrual phase). The results of this study demonstrated a significant increase in pain clinical symptoms during Phase 1 (menstrual) compared with all other phases. Pain was also greater in Phase 5 (premenstrual) compared with Phases 2 and 3 (follicular and periovulatory).

Supporting the contrary view, a number of studies have indicated that menstrual cycle phases are not associated with differences in pain sensitivity. A group recruited 49 women and 48 men to evaluate their perception of pain induced by cold, heat, and ischemia.[7] For women, the early follicular, late follicular, and luteal phases were further examined. Although women were significantly more perceptive of cold pain, heat pain, and ischemic pain compared with their male counterparts, pain sensitivity was not significantly influenced by their menstrual cycle phase.

In a separate study, 60 women undergoing elective surgery using intravenous tramadol for analgesia were placed into follicular and luteal groups based upon their current phase of the menstrual cycle.[8] Pain scores recorded at 6 and 24 hours after the operation were similar for both groups. The lack of difference in scores questions the influence of hormonal fluctuations during the menstrual cycle on pain sensitivity.

Interestingly, an additional study observed differences in pain caused by electrical stimulation affecting the skin, subcutaneous tissue, and muscle based upon the timing of menstrual cycle in women.[9] Contrary to the previous studies, the greatest pain threshold was observed in the luteal phase. The lowest pain thresholds were found periovulatory for skin and perimenstrually for both subcutaneous tissue and muscle. These findings suggest that hormonal effects on pain perception may have tissue-specific influences.

Discussion

Overall, these studies offer variable conclusions as to whether gender or phase of the menstrual cycle affects pain perception. Although limited, they do, however, highlight differences in pain sensitivity between individuals and also various tissue types. The lack of consistency regarding menstrual-related fluctuations of pain sensation warrants more attention and further investigation.

A common limitation of these studies is the small sample sizes, and additional studies should be larger and more robust. Another general limitation is the assumption of menstrual cycle day. The menstrual cycle length is highly variable between individuals and can also vary by month. Additionally, the follicular phase is more variable than the luteal phase, making the phases more difficult to properly predict.[10] Due to this, studies associating pain with temporal aspects of the menstrual cycle would benefit from additional follow-up, increased scrutiny, and direct measurements of various hormone levels.

Despite the inconsistent data, esthetic practitioners should still be aware of the potential for heightened pain sensitivity in perimenstrual patients, especially when this has anecdotally been observed. A common clinical scenario can involve a woman who complains of increased pain during a procedure that she has previously tolerated. The practitioner can question if she is menstruating or explain to her the potential for amplified pain sensitivity during menses, which may replace any notion of operator-dependent error and maintain patient satisfaction. Painful esthetic procedures may also be timed based upon the menstrual cycle for patients who are known to have previously experienced clinically significant variations.

Conclusions

Future clinical studies, especially involving esthetic and dermatologic procedures, are needed to fully evaluate the potential clinical effect.

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